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**General Information**

## Contacts

**Note: use the last 4 digits only to dial internally using 8x8 telephony system**

**Lead Doctor Pathology** Dr V. Sundaresan 01279 - 827097

**Pathology Management** K. French (Pathology Manager) 01279 - 827582

**Pathology Enquires** Blood Sciences 01279 - 973404

Microbiology 01279 - 827138

Cellular Pathology 01279 - 827094

Mortuary Services 01279 - 827089

**Email address**

|  |  |
| --- | --- |
| General Pathology queries | [tpa-tr.pathology@nhs.net](mailto:tpa-tr.pathology@nhs.net) |
| Anticoagulation Monitoring Service | [paht.inrmonitoring@nhs.net](mailto:paht.inrmonitoring@nhs.net) |
| Biochemistry | [tpa-tr.biochemistry@nhs.net](mailto:tpa-tr.biochemistry@nhs.net) |
| Cellular Pathology | [tpa-tr.cellpath@nhs.net](mailto:tpa-tr.cellpath@nhs.net) |
| Haematology | [tpa-tr.pahhaemlab@nhs.net](mailto:tpa-tr.pahhaemlab@nhs.net). |
| Haemoglobinopathy screening Services | [paht.hopslab@nhs.net](mailto:paht.hopslab@nhs.net) |
| Microbiology (including Serology) | [tpa-tr.MicroPAH@nhs.net](mailto:tpa-tr.MicroPAH@nhs.net) |
| Blood Transfusion | [paht.transfusion@nhs.net](mailto:paht.transfusion@nhs.net) |
| Pathology I.T. Systems | [Paul.Gonzales@nhs.net](mailto:Paul.Gonzales@nhs.net) |

**Pathology Quality Manager** Gertrude Martindale (8X8) – 01279 827582

## Consultants & Clinical Advisors

Dr R. Saldana Consultant Chemical Pathologist 01279 973386

Dr M Parsons Consultant Clinical Scientist 01279 444457

Dr F. AI Refaie Consultant Haematologist 01279 978858

Dr Kameta Imaeva Consultant Haematologist 01279 827190

Dr. Ali Shokoohi Consultant Haematologist

Dr V. Sundaresan Consultant Histopathologist 01279 827097

Dr S. Arif Consultant Histopathologist 01279 827352

Dr M. Mohammed Consultant Histopathologist 01279 978407

Dr N. Jain Consultant Histopathologist 01279 827098

Dr P Gopinath Consultant Histopathologist 01279 827514

Dr S Al-Ramadhani Consultant Histopathologist 01279 444455 ext 3101

Dr R Hasan Consultant Histopathologist 01279 827095

Dr K Sherring Consultant Histopathologist 01279 978410

Dr Angela Cymerman Consultant Histopathologist 01279 827356

Dr Claire Waites Consultant Histopathologist 01279 978408

Dr S. Visuvanathan Consultant Microbiologist 01279 827140

Dr. Pushpa  Consultant Microbiologist 01279 974543

Dr. Karunasagar Specialty Doctor Microbiology 01279 978608

Jenny Kirsch Senior Infection Prevention and

Control Nurse 01279 978873

|  |  |
| --- | --- |
| **Anticoagulation Monitoring Service** | |
| Anticoagulant nurses | 8x8 3656 |
| Anticoagulant pharmacist | Alertive or 8x8 8916 |
| Anticoagulation Lead | 8x8 3434 [claire.gibson12@nhs.net](mailto:claire.gibson12@nhs.net) |
| INR Monitoring Service | 01279 827031 / 827599 |

|  |  |
| --- | --- |
| **Antenatal Clinic screening IDPS** |  |
| Clinical Lead IDPS  Dr Visuvanathan Consultant Microbiologist | 01279 - 827140 |
| IDPS Laboratory screening Lead  Debbie Orriss Microbiology Lab manager | 01279 978856 |
| IDPS laboratory screening Deputy (vacant) | 01279 973147 |
| Microbiology | 01279 827353 |
| Serology | 01279 973147 |

|  |  |
| --- | --- |
| **ANNB Sickle Cell and thalassaemia** |  |
| Clinical Lead  Dr Faris Al-Refaie | 01279 - 827035 |
| Laboratory screening Lead BMS  Eva Nkansah CBMS | 01279 444557 |
| laboratory screening Deputy  Annah Chabva-Shoperai | 01279 973214 |

## Clinical Service

The Pathology Directorate has Consultant Pathologists who are supported by a team of Scientific and Technical staff, Medical Laboratory Assistants, Phlebotomists, Clerical Support and Ancillary staff. All the qualified Health Care Professionals are registered with the appropriate professional body. All Consultants are available to discuss results or give advice on problems associated with their own specialty.

## Phlebotomy

Phlebotomy uses paperless requesting and collection via ICE. Please ensure that you use ALL of the request forms printed from ICE.

Patients attending for blood tests should make an appointment.

Patients are able to attend the Princess Alexandra Outpatients department only for urgent blood tests without a pre-booked appointment

Appointments for blood tests should be made online [Our services | Princess Alexandra Hospital (pah.nhs.uk)](https://www.pah.nhs.uk/our-services/service/blood-tests-30/), or by telephone 01279 827163

Adult appointments are held at:

* The Princess Alexandra Hospital in Harlow from 07:00am – 4:30pm Monday to Friday
* St Margaret’s Hospital in Epping from 08:30am - 4:30pm Monday to Friday
* Herts and Essex Hospital in Bishop's Stortford from 08:00am - 4:00pm Monday to Friday
* Waltham Abbey Health Centre 08:30am – 11:30am Monday, Thursday and Friday
* Ongar Health Centre 09:00am – 11:30am Tuesday to Thursday

Phlebotomy is also provided at 11 GP sites in the Harlow area and a walk-in clinic at Rectory Lane Health Centre, Loughton Tuesday, Wednesday and Friday 10:30am – 11:45am

Children’s blood tests are available at Princess Alexandra only.

By appointment Monday to Thursday 08:00am – 12:00pm

An appointment system is in operation for certain specialised tests:

* Sweat Tests (01279 973376)
* Cryoglobulin (01279 973376)

Please telephone the laboratory for advice.

## Out-Patient Clinics

The following referral clinics are held by Consultant Pathologists:

**Dr R. Saldana Consultant Chemical Pathologist.**

1. Lipid Clinic, alternate Monday mornings at St. Margaret’s Hospital.
2. Lipid Clinic, alternate Wednesday mornings at Herts and Essex Hospital.
3. Lipid Clinic alternate Friday mornings at Princess Alexandra Hospital

**Dr F. N. AI-Refaie, Consultant Haematologist**

1. Haematology clinic, Tuesday mornings at St. Margaret’s Hospital.
2. Haematology clinic, Wednesday morning at Princess Alexandra Hospital.

**Dr Imeava.**

1. Haematology clinic, Tuesday morning at Herts and Essex Hospital.
2. Haematology clinic, Friday mornings at Princess Alexandra Hospital

**Quality Standards**

**‘The Pathology Directorate of The Princess Alexandra Hospital NHS Trust is committed to providing a service of the highest quality and shall be aware of and take into consideration the needs and requirements of its users, other service providers, clinicians and patients.’**

The majority of routine tests in Chemical Pathology and Haematology are carried out on the same day. For hospital-based test requests results are available via ordercomms (ICE) as soon as they have been processed, tests requests in the community or by GPs results are available after validation. All urgent or significantly abnormal results will be telephoned. Urgent tests are processed within 60 minutes of receipt in the laboratory.

A preliminary report for most routine Microbiological cultures is available the day after receipt. However, for certain types of culture, there may be a minimum delay of 48 hours until a report is issued. For TB investigation the cultures take up to 6 weeks and for fungal investigations up to 3/4 weeks.

Small diagnostic biopsies (urgent) to be reported within 7 days - 90 % compliance as per RCpath guidelines and larger more complicated tissue cases (excisions) requiring more investigative work will be reported within 10 working days.

Results of more specialised tests in each discipline may take longer. This will depend on the frequency of carrying out the investigation or the necessity to send the sample to a reference laboratory for analysis. The laboratory will be pleased to answer queries on the turnaround times of a particular test.

**Monitoring Standards**

The above standards will be reviewed on a regular basis through the Pathology Department's Quality Management System (QMS).

## Location & Opening Times

The Pathology Department at **The Princess Alexandra Hospital** is situated on the ground floor in the main hospital block, the Pathology sample reception is situated at the entrance to the Pathology Department.

Cellular Pathology (Histology & Non Gynae Cytology) is located in the Michael Letcher Cellular Pathology Building at The Princess Alexandra Hospital.

Phlebotomy is situated in the main Out-Patient Department for GP and OPD patients

There is also a GP and Out-patient phlebotomy at **Herts and Essex and St. Margaret’s Hospital** is located in the Out-patient department of the Hospital, see above for opening times.

## Routine Laboratory Hours (Monday to Friday)

* Blood Sciences (Haematology and Chemical Pathology) 8.30am - 7:00pm
* BT 8.30am - 7:00pm
* Microbiology 8.30am - 5.00pm
* Cellular Pathology 8.30am – 5:00pm

Request Forms

Electronic requesting is the preferred method for Haematology, Biochemistry, Microbiology and Cellular Pathology. Please ensure that you use ALL of the request forms printed from ICE, especially since Blood Sciences (Biochemistry & Haematology) print separately to Microbiology as does Cellular Pathology.

|  |  |  |  |
| --- | --- | --- | --- |
| **Request for** | **Available From** | **Colour of form** | **Title of form** |
| Chemical Pathology & Haematology | Pathology | White (OrderComms)  Red on White  Pink – Urgent ED samples only | OrderComms  Request  CHEM/HAEM |
| Ante Natal Serology | Pathology  ANC | Black on Pink (8-10 weeks) Multi (A4)  White (OrderComms) (28 weeks) | ANTE NATAL TESTS  Family origin questionnaire |
| Blood Transfusion | Pathology | Red on White | CROSSMATCH REQUEST |
| Microbiology | Pathology | White (ICE/ EHR)  White  Blue on White | OrderComms  Request  MICROBIOLOGY |
| Histology / Non-gynae | Histology / Non-gynae – To be requested on ordercomms (ICE) forms where possible | | |
| Histopathology / Non Gynae | Intranet, Cancer and Diagnostics, Pathology Forms | Black on White | HISTOLOGY/ CYTOLOGY |
| Cellular Pathology – Breast Specimen | Intranet, Cancer and Diagnostics, Pathology forms | Black on White | CELLULAR PATHOLOGY – BREAST |
| Cellular Pathology – Prostate Biopsy  Template and Transperineal | Intranet, Cancer and Diagnostics, Pathology forms | Black on White | CELLULAR PATHOLOGY – PROSTATE BIOPSY |
| Cervical Cytology | Provided by NNUH service provider | | |

## **Electronic requesting (OrderComms via ICE)**:

ICE eLearning is available via our Digital Learning Solutions.  Please click [here](https://www.dls.nhs.uk/v2/LearningMenu/39669),

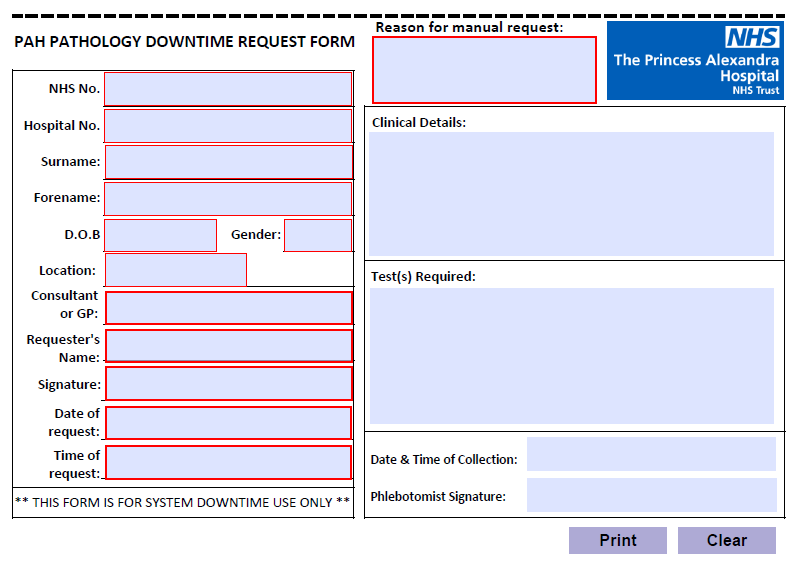
For PAH staff with access to the intranet click [here](https://alexnet.pah.nhs.uk/workspaces/information-technology/navigate/1566/482#bID-1566) for IT Training on ALEX, scroll down the screen for Digital Learning Solutions and also ICE pages – click on the relevant images

Electronic requesting is the preferred method for Haematology, Biochemistry, Microbiology and Cellular Pathology. Please ensure that you use ALL of the request forms printed from ICE, especially since Blood Sciences (Biochemistry & Haematology) print separately to Microbiology as does Cellular Pathology. You will require a personalised ICE login which can be obtained by e-mailing the full name, job role (e.g. Locum GP, Nurse. GP Receptionist), national registration code (where relevant, such as the GMC or NMC) and the location at which the ICE User will be working to the IT Service Desk via email paht.itservicedesk@nhs.net. Badly printed forms and forms without relevant clinical details will not be accepted and will delay processing.

Hand written request forms**:**

Hand written request forms are ONLY acceptable following a downtime for ICE or by prior arrangement with Pathology due to an IT issue for the requesting location.

Only the “Pathology Downtime Request Form” will be accepted in these circumstances & a full explanation as to why this form is being used must be given, as well as the date & time that the hand-written request was made. The downtime form looks as follows (please note that minor changes may occur between this image & the final form being used during ICE downtime):



This form **MUST** be used when making a hand-written request. The form must be completed in **full** with ball point pen in **block capital letters**.

If VHF is suspected laboratory should be informed before the samples are collected and the test request agreed, the risk assessment grading should be noted on the request form.

Please ensure that the **destination and requesting consultant/GP code** are given. Requests from hospital wards and A/E must have the bleep number of the requesting clinician. The Hospital number should be used when known, as should the NHS number where known.

The Patient Information to be completed on the request form by requestor for all form types**:**

1. The reason for using the manual, handwritten request form rather than ICE Order Coms.
2. Hospital Number and NHS number (if allocated)
3. Patients Surname and First name (registered name not calling name)
4. Patient’s DOB
5. Patient’s Gender
6. Location for the report to be sent
7. Consultant or GP for the report to be sent to
8. Requestor’s name and signature as well as date and time of request
9. Clinical Details, including (for non-blood tests) Specimen Type and where appropriate, anatomical site (reason for the request and any underlying conditions / drug therapy which may affect result interpretation or advice on treatment.) This field is mandatory. If not completed this may delay processing.
10. The test or tests required for this specimen
11. Date and Time of Specimen Collection, IF taken by requestor, else please leave this blank for specimen collector to complete. This will be the phlebotomist for blood tests and the patient or carer for a Microbiology sample.

Microbiology the following additional information should be given**:**

1. Clinical details to include any anti-microbial treatment (recent, current and intended)
2. Foreign travel
3. Date of onset and duration of illness, particularly for serology
4. In the case of anti-microbial assays, date of last dose of anti-microbial and time given
5. Specify anatomical site from which "wound" specimens were taken
6. Useful epidemiological information, e.g.: date of contact if relevant
7. Date and time of collection should be stated
8. Date of contact e.g. for Chickenpox immunity checks in pregnancy

Minimum sample labelling requirements and specimen rejection criteria are available from departments on request

Additional Information for Cellular Pathology request forms**:**

All urgent specimens should be discussed with a member of the laboratory team and marked clearly on the request form. Requests for frozen and other intra-operative assessments must be booked with a Consultant Pathologist.

All Cellular Pathology paper forms when IT systems / Ordercomms are down are available via the intranet; clinical areas, cancer and core services, pathology, pathology forms, or call the general office ext. 7094 for a master copy to be sent or emailed.

The Cellular Pathology request form can be used for all Histology and Non-gynae Cytology samples.

Instructions for filling in the request forms - the form must have

1. The correct patients name – matching the patients sample pot/s
2. Hospital number
3. Date of birth
4. Time and date sample taken
5. Location
6. Consultant name and signature
7. Sample description
8. LMP if appropriate
9. Clinical details
10. Alerts – if applicable

## Confidentiality / Information Governance

The Pathology departments adhere to Trust policy regarding confidentiality & Information Governance.

## Consent

The Pathology department follows the Trust policy on consent.

Mainly the Pathology Department relies on requesting clinicians to meet the requirements for patient consent for the appropriate investigations requested and conducted and will take consent to be given if patient attends for a blood test (presents arm) or delivers a sample.

## Specimen Collection

At **Princess Alexandra Hospital** there is a phlebotomy ward service. The request forms for phlebotomy are delivered to the Pathology Department by **7.00 am**, and the ward round commences at **7:15 am**. This is a strict dead-line, so please ensure that ‘Ordercomm’ request forms are ready for collection by the porters. If the porters do not collect the forms, then it is the responsibility of the ward staff to ensure that the forms are delivered to the laboratory so that they can be included in the phlebotomy round. **Badly printed forms will not be accepted.**

Laboratory staff carry out in-patient phlebotomy at Princess Alexandra Hospital, so that the rounds can be completed as quickly as possible and the work returned to the laboratory for analysis as early in the day as possible. Once the ward has been visited by laboratory staff, further urgent phlebotomy must be carried out by the medical staff.

**Patients who are being barrier or reversed barrier nursed will be bled by a specialist phlebotomist at the end of each ward round except at weekends or bank holidays. The forms must be clearly marked as \*Barrier Nursed\*.**

Doctors are reminded that they should inform the patient if they are required to fast before attending for a blood test. Fasting is plain water only for a minimum of 12 hours prior to blood test. This avoids a wasted journey by the patient and prevents them venting their anger on laboratory reception staff.

At **Herts & Essex** and **St. Margaret’s Hospital,** phlebotomy is performed in the Outpatient department only. On the wards, it is the responsibility of the medical staff to take their own blood samples at these hospitals.

In addition, an outpatient phlebotomy community service is provided at:

* Rectory Lane Clinic, Loughton
* Ongar War Memorial Clinic
* Regular service at 11 other GP practices

### Blood Collection Technique

In this Trust, the preferred method of blood collection is by the use of a multi-sample evacuated blood collection system; **Vacutainer**

### Order of blood draw for multiple tube collection:

* Blood cultures mix by inverting 8 – 10 times
* Citrate Tube mix by inverting 3 – 4 times
* Gel separator tube or plain serum mix by inverting 5 times
* Heparin mix by inverting 8 – 10 times
* EDTA mix by inverting 8 – 10 times
* Fluoride Glucose tube mix by inverting 8 – 10 times

Please note when labelling forms and samples to note the name of the person who has collected the samples and also note the time of sample collection.

### Blood Cultures

Blood culture bottles used are **BioMerieux BacT/ALERT Blood Culture Bottles**

The BioMerieux BacT/ALERT Microbial Detection System is used to determine if micro-organisms are present in the blood taken from a patient suspected of having bacteraemia.

Only staff who have been trained and are competent in venepuncture and asceptic technique are able to take blood cultures. A blood culture pack is available (not for paediatrics) which includes all equipment required to take the sample and instructions for the correct procedure to be followed. An electronic request must be made on EHR.

#### Blood Culture Storage Instructions

BacT/ALERT Blood Culture bottles are ready for use. Store protected from direct sunlight at room temperature (15-30ºC). An expiry date is printed on each bottle label. Do not use the culture bottles beyond the last day of the month indicated.

#### Blood Culture Procedural Notes and Precautions

* 1. Great care must be taken to prevent contamination of the patient sample during venepuncture and during inoculation in to culture bottles. Contamination could lead to a specimen being determined positive when a clinically relevant isolate is not actually present. This leads to an unnecessary waste of Microbiology resources and the inappropriate use of antibiotics.
  2. Obtain blood samples prior to initiating antibiotic therapy. If this is not possible, blood should be drawn immediately before administering the next antibiotic dose.

c. Use disposable gloves and handle inoculated bottles cautiously as though capable of transmitting infectious agents. Consult the Staff Health and Wellbeing Department immediately if materials are ingested or come into contact with open lacerations, lesions or other breaks in skin (including needle stick injury)

d. If inoculating more than one type of BacT/ALERT blood culture bottle using a butterfly blood collection set and direct draw adapter cap, inoculate aerobic bottle (blue cap) first and then the anaerobic culture bottle (purple cap) so that any oxygen trapped in the tubing will not be transferred to the anaerobic bottle.

* Collect the blood using a butterfly blood collection set and the BacT/ALERT blood culture adapter cap as recommended by the Trust and inoculate directly into the culture bottle at the patient’s bedside. Although lower volumes can be used, recovery may be improved using sample volume closer to the recommended 10 mls. To prevent over inoculation, monitor the blood volume intake into the culture bottle, using the 5 ml incremental markings on the bottle label.
* In the case of paediatric samples 3-5 mls is recommended as optimal volume
* Monitor the direct draw process closely at all times during collection to assure proper flow is obtained and to avoid flow of bottle contents into the adapter tubing. Due to presence of chemical additives in the culture bottle, it is important to prevent possible backflow and subsequent adverse reactions by following all steps below
* Tightly connect the adapter cap to the luer connector of the collection set
* Maintain control of the luer connector by securing it between thumb and forefinger. Place the adapter cap on the aerobic bottle septum and press down to penetrate and obtain blood flow. Verify that blood flows in to the bottle. Hold the adapter cap down on the bottle during collection.
* Hold the culture bottle at a position below the patient’s arm with the bottle in an upright position (stopper uppermost)
* Release the tourniquet as soon as the blood starts to flow into the culture bottle, or within 2 minutes of application
* Do not allow the culture bottle contents to touch the stopper or the end of the needle during the collection procedure. A contaminated culture bottle could contain positive pressure, and if used for direct draw, may cause reflux in to the patient’s vein. Culture bottle contamination may not be readily apparent. Monitor the direct draw process closely to avoid reflux. Do not use a bottle that contains media exhibiting turbidity, a yellow sensor (bottom), or excess gas pressure: these are signs of possible contamination.

#### Specimen Labelling

Label the BacT/ALERT Blood Culture bottles with the label generated on making the request on ICE which will include the following:

* Hospital Number or NHS number
* Patients Name
* Patients DOB
* Date and Time of Specimen
* Name / initials of person collecting sample

Each Blood Culture Bottle has detachable barcode labels – these **MUST NOT** be removed from Blood Culture Bottle as they are for Laboratory use only. The prompt loading of blood cultures is imperative and there is an analyser in the ED department for out of hours loading

#### Blood Culture Results

1. Blood cultures are incubated for 5 days (except for investigations for sub-acute bacterial endocarditis which are kept up for 10 days).
2. The automated BacT/ALERT machine continually monitors the blood culture bottles for evidence of bacterial growth.
3. The majority of micro-organisms will grow within 48 hours (~95%) and consequently if no growth is detected after 48 hours an interim negative report is issued. If growth occurs after 48 hours a further report will be generated. Paediatric Blood Cultures are read at 36 hours in line with Sepsis guidelines and neonatal infection guidelines.
4. It is very important to understand that when telephoning the laboratory for the status of a blood culture (that is still being monitored by the blood culture machine) any negative status may subsequently change.

General Measures for Blood Collection to Obtain Valid Results**:**

1. Avoid venous stasis by the prolonged use of a tourniquet.
2. Using a vacutainer, allow the blood to flow into the tube, to the pre-determined volume, controlled by the amount of vacuum in the tube. It will **never** overfill. Inadequate samples may affect the result of the test when a liquid anti-coagulant is used in the tube and such samples are unsuitable for coagulation testing and ESR measurement.
3. To avoid haemolysis of the sample **do not squirt blood through the needle.** If you have resorted to the use of a syringe and needle in the case of difficult venepuncture, **slowly** eject the blood into the tube, having removed the rubber bung of the sample tube. Piercing the rubber bung with the needle increases the risk of needle stick injury and will compromise the integrity of the specimen.
4. Always invert the tubes several times after the blood has been collected, to ensure the blood is adequately mixed with the anticoagulant, to prevent the sample from clotting. **Do not shake.**
5. Avoid contamination of the sample with IV fluids by not bleeding from a drip arm or from a heparinised line for clotting studies. **Do not tip blood from one type of collection tube to another.**
6. Ensure that the sample is put into the correct tubes for the tests required. Refer to alphabetical list in section 3 & 4
7. Label sample with order comm. label orhandwrite clearly the full name, ward and date. (See special notes for Blood Transfusion samples). Addressograph labels are not suitable for blood collection tubes
8. All samples must be transported to the laboratory in individual polythene specimen bags with their fully completed request form.

**Unlabelled and inadequately labelled samples cannot be accepted in the interest of the patient.**

### 24 Hour Urine Sample Collection

When a 24-hour urine collection is requested the sample bottles can be collected from Pathology Reception. The bottle and a collection instruction will be given to the patient.

**CAUTION:** for some tests (Catecholamines &5 HIAA) the bottles contain acid to preserve the urine. If splashed on skin wash thoroughly with large amounts of water. If splashed in eyes wash thoroughly with water for 10 minutes and obtain medical attention. These bottles should be stored safely away from children.

### Samples that should be considered as High Risk

Please minimise requests to those that are essential to aid diagnosis or for the management of patients in these categories and ensure clear clinical details are given to ensure the samples are processed in the correct category laboratory.

Please follow these instructions so that risks to our staff are minimised.

Specimens that must be considered as a high risk if they come from patients:

* Known to be Hep B positive.
* With known or suspected viral hepatitis or with Jaundice of unknown cause.
* Known HIV positive, or partners of these, or with persistent generalised lymphadenopathy.
* Known to be IV drug abuser.
* Known or suspected cases of Brucellosis, Typhoid, Paratyphoid or Creutzfeldt-Jakob disease.
* Recently returned from abroad with undiagnosed PUO? / Query VHF (Ebola virus/ Marburg etc.? MPox) or? / Query Malaria. If VHF / MPox is suspected the Infection Control team must be contacted and a full risk assessment carried out. The laboratory must be informed of the result of the assessment as to whether the patient is minimum, moderate of high risk of VHF / MPox. If high risk samples should not be taken without prior agreement from Consultant Microbiologist.

### Unacceptable Samples

* Leaking mislabelled and unlabelled samples are unacceptable.
* Specimens without forms will not be processed.
* Samples too old to process in accordance to protocol

Copies of Departmental rejection criteria procedures will be made available on request from the required department

### Specimen Packaging & Transport

Full guidance is given regarding Specimen Transportation and packaging can be found in the Specimen Packaging and Transportation guidance.

#### External Transportation

All samples should be placed in a sealed leak proof polythene specimen bag before transport.

Follow instructions below **adding** sufficient additional absorbent material between the primary and secondary packagesto absorb all fluid in case of breakage, to comply with packaging instructions P650 under the Transport of Dangerous Goods Act

#### Specimen Packaging for Internal Transport

Cellular Pathology and Main Pathology are located in separate areas of the hospital. By ensuring that the correct bag is used for each specimen, they will be sorted much quicker and therefore delivered to the right department without delay.

#### Cellular Pathology Specimens– BLUE BAGS

* Ensure pot is correctly sealed to prevent leakage.
* Label specimen pot with the correct patient information.
* Place in blue bag with sealable pouch with absorbent padding.
* Seal bag.
* Complete the request form (please include time of collection) in back pocket of bag.
* Leave at collection point (call a porter if necessary) / Transport collection

area.

* The porters know to bring the blue bags straight to Cellular Pathology.

#### Main Pathology Specimens– CLEAR BAGS

Main Pathology (Haematology, Chemical Pathology, Microbiology, Pre and post analytical, Blood Transfusion)

* Specimens for main pathology include:
* Swabs
* Bloods
* Urine for MC&S (micro, culture and sensitivity)
* Faecal specimens
* Skin scrapings and nails
* Sputum for microbiology
* CSF for microbiology
* Pleural fluid for microbiology
* Ensure pot is correctly sealed to prevent leakage.
* Label specimen tube / pot and place in clear (colourless) bag with an

absorbent pad.

* Seal bag.
* Place completed request form / Ordercomms form (please include date and time of collection) in back pocket of bag.
* Leave at collection point (call a porter if necessary) / Transport collection

area.

* The porters know to bring the blue bags straight to Cellular Pathology.
* Leave in transport collection area.

#### Transportation

This can be used for all samples including body parts and biopsies. Specimens are brought by the porters or by the requestor.

On weekdays, Mondays to Friday, there are inter-hospital transport runs to transfer of pathology specimens from Herts and Essex and St Margaret’s Hospital to Pathology at Princess Alexandra Hospital. At weekends and out of normal daytime working hours, requests for transport to send urgent specimens to Princess Alexandra Hospital should be made to the switchboard.

Hospital transport provides a specimen collection form Surgeries for all specimens. Some samples may be required to be stabilised and/or delivered rapidly to the laboratory. Please check with the relevant discipline.

Avoid exposing blood samples to extremes of temperature and do not store / place in direct sunlight

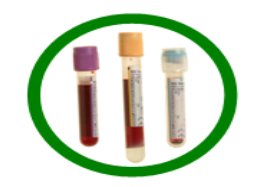
### Emergency Department Pneumatic Chute System

A pneumatic sample delivery chute is in use for the Emergency Department to send urgent Blood Science specimens to the Main Pathology Department. Only **blood** samples should be sent using this system (with the exception of glass bottles), all other samples MUST be sent via portering.

Samples **must be** put in a sealed bag and **placed in the pod** (carrier)

* No frozen sections or histology/cytology samples
* No leaking, damaged or contaminated Samples
* No bulky containers – do NOT cram samples in pod
* No Non-sample Items

**Permitted Samples**

****

**Blood Samples**

(Only in Vacutainers Inc Paediatric samples)

**Prohibited Samples**



**Blood Cultures Universals & Pots Swabs in Gel**

(Containing Liquids e.g. Urine,

Or Solids e.g. Stools or Tissue Samples)

### CSFs

#### Swabs in Liquid

1. Place blood specimens in bag and seal
2. Place Specimens in pod (Open pod by twisting end with arrow on) the specimen bag should then be sufficiently cushioned within the POD to prevent damage
3. Close pod
4. Place pod in Chute Station
5. In case of breakdown contact the labs

## Report Delivery

### Wards & Clinics

Report available electronically, with hardcopies being issued to clinics.

### GP Surgeries

Most surgeries receive downloads of reports electronically as they are generated by the department.

Some surgeries can receive at least one delivery of reports and collection of samples. Otherwise reports will be posted by first class mail. Exceptionally urgent reports can be transmitted by NHS NET email

## Complaint Procedure

### Reporting of Complaints

Pathology complies with the trust policy; Policy and Procedure for Responding to Complaints and progressed following the Trust Investigation of Incidents, Complaints and Claims.

### Patient Advice & Liaison Service (PALS) Investigations

PALS may ask us to investigate an incident / concerns from a patient who has contacted them. These investigations into informal complaints are conducted in the similar way as formal investigations.

### Other Sources of Informal Complaint

Informal complaints may also arise from e-mail and telephone conversation and are investigated following Trust Policy

## Advisory activities

Laboratory management will ensure appropriate advice and interpretation is available and meets the needs of patients an users. This will include, professional judgement on the interpretation of results, effective utilization of laboratory examinations and advising on scientific and logistical issues.

# Enquiries

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[**Telephone Enquiries 24**](#_Toc169097196)

[Clinical Advice and Interpretation 24](#_Toc169097197)

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[**Microbiology Clinical & Infection Control Advice 24**](#_Toc169097200)

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[Additional Tests 27](#_Toc169097211)

## Enquiries

All wards and most departments and GP surgeries have direct access to Pathology Results via PCs at the nurse's station. PathWeb is continually updated from the laboratory computer system as laboratory results are authorised. If you have difficulty using the system, call the pathology IT manager (01279 978676) and ask for a training session, which will take less than 5 minutes.

**Note: use the last 4 digits only to dial internally using 8x8 telephony system**

### Telephone Enquiries

Blood Sciences 01279 - 827030

Microbiology 01279 - 827138

Cellular Pathology 01279 - 827094

Mortuary Services 01279 - 827089

Warfarin clinic 01279 - 827031/ 01279 - 827599

## Clinical Advice and Interpretation

Call or bleep the relevant Consultant,

Out of hours Haematology, Chemical Pathology and Microbiology Consultants are contactable via switchboard

### Chemical Pathology Clinical Advice

Dr R. Saldana Consultant Chemical Pathologist 01279 973386

Dr M Parsons Consultant Clinical Scientist 01279 973040

### Haematology Clinical Advice

Dr F. AI Refaie Consultant Haematologist 01279 978858

Dr Ali Shokoohi Consultant Haematologist 01279 978906

Dr Kameta Imaeva Consultant Haematologist 01279 827190

### Microbiology Clinical & Infection Control Advice

Dr S. Visuvanathan Consultant Microbiologist 01279 – 827140

Dr Pushpa Sajaan  Consultant Microbiologist 01279 – 444543

Dr Anusha Karunasagar Specialty Doctor Microbiology 01279 - 978608

Jenny Kirsch Senior Infection Prevention and Control Nurse 01279 – 978873

### Cellular Pathology Clinical Advice

Dr V. Sundaresan Consultant Histopathologist 01279 827097

Dr S. Arif Consultant Histopathologist 01279 827352

Dr M. Mohammed Consultant Histopathologist 01279 978407

Dr N. Jain Consultant Histopathologist 01279 827098

Dr P Gopinath Consultant Histopathologist 01279 827514

Dr S Al-Ramadhani Consultant Histopathologist 01279 444455 ext 3101

Dr R Hasan Consultant Histopathologist 01279 827095

Dr K Sherring Consultant Histopathologist 01279 978410

Dr C Waites Consultant Histopathologist 01279 978408

Dr A Cymerman Consultant Histopathologist 01279 827356

## Blood Sciences - Technical Enquires

### Chemical Pathology

Lead Biomedical Scientist (Adeolu Adewuyi) 01279 973040

Main Laboratory 01279 973404

Manual Laboratory 01279 973376

### Haematology & Blood Transfusion

Transfusion Laboratory Manager (Luke Groves) 01279 978184

Head Biomedical Scientist Haematology (Eva Nkansah) 01279 444557

Main Laboratory 01279 978360

Coagulation / Anticoagulant clinic 01279 978568

Anticoagulation Monitoring Service 01279 827031/ 01279 827599 (Service is ONLY Monday-Friday 08:30-17:30)

## Non- Blood Sciences - Technical Enquires

### Microbiology

Head Biomedical Scientist (Deborah Orriss/ Ricardo Davis) 01279 978856 / 01279 978607

Main Laboratory 01279 827353

### Cellular Pathology

Head Biomedical Scientist 01279 827096

(Histopathology – Lisa Greenhalgh)

Main Laboratory 01279 978286

Mortuary Manager (Kenneth Connolly) 01279 978728

## Validity of Results

While quality assurance programs are in operation throughout the departments to ensure accuracy and precision, random errors may occur and escape detection. Often clinicians are best placed to detect such errors. If you doubt the validity of a result, please let us know at once, as samples can often be re-analysed.

## Interpretation of Results

The Senior Clinical Staff in all departments are always willing to discuss the accuracy and the confidence limits of any tests, the selection of appropriate tests or the significance of a result (please see Telephone Enquiries).

Some factors that may be considered in the interpretation of results are as follows:

* Some analytes have daily variation e.g. glucose and phosphate.
* Posture and/or venous stasis may affect protein bound analytes e.g. calcium, and in conjunction with Haemoglobin and Haematocrit levels in cases of PRV.
* Un-separated serum could increase potassium values.

## Drug Interference

This list highlights the most common interferences and is not exhaustive:

* Drugs employing chelating agents such as EDTA (even in trace amounts) decrease values for serum calcium or any other divalent ion e.g. magnesium.
* Large doses (e.g. as in prophylactic self-administration) of ascorbic acid can affect urate assays.
* High levels of protein, glucose and acetoacetate affect creatinine assays - hence in diabetic patients with high levels of glucose and acetoacetate, the plasma creatinine measurements can be unreliable. High bilirubin levels can falsely lower creatinine results.
* Oral contraceptives (and pregnancy) cause increases in binding proteins e.g. cortisol binding globulin.
* Anticoagulant treatment affects coagulation studies and thrombophilia screens.

This is only a limited list of some common factors affecting test results. If there is any doubt about the validity of an analytical result or drug effect please contact the laboratory.

## Additional Tests

Additional tests can be requested by contacting the laboratory within the storage time given below. However, retrospective addition of certain tests may not be possible due to sample stability requirements e.g. troponin. Please note gentamicin add-ons are not allowed due to patient safety reasons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Duration of storage** | | | |
| **Sample Type** | **Biochemistry** | **BT** | **Haematology** | **Microbiology** |
| Whole Blood | 5 days | 7 Days | 1 Day | 2 Days |
| Serum | 3 days | N/A | N/A | 4-6 weeks (ANC/Needle stick recipients 2yrs) |
| Urine | N/A | N/A | N/A | One day |
| Stools | N/A | N/A | N/A | One week |
| Sputum | N/A | N/A | N/A | Additional tests cannot be requested as the procedure for processing this sample makes it unsuitable for further testing e.g. for AFB. A fresh sample is required |
| CSF | One month | N/A | N/A | 15 days |
| Tissue | N/A | N/A | N/A | 4 weeks |
| Fluid | 3 days | N/A | N/A | 2 weeks |
| Referred out tests | One month | N/A | N/A | NA |

Additional tests can be requested within the stored time.

# Urgent Investigations

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[Blood Transfusion 31](#_Toc169012449)

[Microbiology 33](#_Toc169012450)

## During Routine Working Hours

### Chemical Pathology

The laboratory should be informed of all urgent requests from wards by telephone. Request forms should be clearly marked “urgent” on the request form with the bleep or telephone number of the requesting doctor. All urgent tests are carried out on site at Princess Alexandra Hospital and abnormal results phoned to the requesting clinician (if bleep number available on the request form) or to the ward.

#### ITU and SCBU

For all routine samples arriving in the laboratory by 08.30am, the results will be available on ICE/Path Web to the ward by 10.00.

#### Accident & Emergency

Samples arriving from Accident & Emergency will be in Red urgent sample bags and treated as urgent

#### Elective Urgent Work

Some tests occasionally may need to be carried out on very sick patients at least every 24 hours. Because these can be predicted they are not emergency investigations, but should be called “elective urgent work”. All such work on Saturdays, Sundays and Public Holidays must reach the laboratory by 12.00 hours. Therefore, such samples from St. Margaret’s should be sent by the 11.00am transport.

### Haematology

#### Princess Alexandra Hospital

All urgent tests are carried out on-site at Harlow. The requesting doctor will call Haematology on ext. 3214 to alert the laboratory. A bleep or contact number should be written on the form, so that results can be telephoned back. For requests for urgent crossmatching the Blood Transfusion department should be contacted via Alertive.

#### St. Margaret’s Hospital & Herts & Essex Hospital

All crossmatching for St. Margaret’s and Herts & Essex Hospitals patients is carried out at PAH. Please call phone Blood transfusion department on 01279 962266.

## Outside Routine Working Hours

### Chemical Pathology

8.00pm - 8:30am (Monday to Friday)

24hrs on weekends and bank holidays.

A Consultant Chemical Pathologist/Clinical Scientist is available via switchboard for clinical advice out of hours.

#### Out of hours test repetoire:

U&E

LFT

Bone

Glucose

Lactate

Amylase

Paracetamol

Salicylate

Gentamicin

Creatine Kinase

Urate

Magnesium

CRP

Troponin I

HCG (Ectopic)

Osmolality

Therapeutic Drugs (lithium, theophylline and digoxin)

Cholesterol.

#### The tests available by arrangement with laboratory are:

Vancomycin

CSF Glucose & Protein

CSF Xanthochromia

Ammonia,

Phenytoin

Carbamazepine

Amikacin.

Other tests outside those listed above may be available, but must be authorised by the on-call Consultant Chemical Pathologist/Clinical Scientist.

Samples for paracetamol should not be taken until 4 hours after ingestion and BEFORE Parvolex is given as it interferes with the assay. If negative, the test does not need to be repeated. Allow at least 6hrs after giving Parvolex before repeating the test.

The on-call service is NOT available for routine pre-op screening.

## Haematology

The tests generally available on-call are:

Full blood count and Reticulocyte count

Erythrocyte Sedimentation Rate (ESR)

Infectious Mononucleosis Screening (Paul Bunnell)

Clotting screen (PT, APTT, Fibrinogen)

D-Dimers (to exclude DVT or detect fibrinolysis)

Blood film for the diagnosis of malarial parasites

Sickle screening

Any significant Haematology or coagulation problems should be discussed with the Consultant Haematologist on call (contact via switchboard) by the appropriate Registrar or Consultant dealing with the patient

## Blood Transfusion

Primary communication with the Transfusion lab is via Alertive on the following role: ‘Blood Transfusion Dept BMS (Blood Bank)’ – 24hours per day/365 per year.

Transfusions out of hours should only be performed in an emergency. If blood is required send a message via Alertive indicating the reason of your request, who you are and your extension number so the BMS can call back to confirm/request further details. Please note, a request for blood cannot be done entirely via Alertive and it is mandatory that the BMS phone the requesting Doctor before release of blood. Laboratory staff will inform you if a crossmatch sample or is required. In critical emergencies, please follow the massive blood loss/major haemorrhage procedure in the Blood Policy.

Ensure all samples and requests to the laboratory are clearly labelled with the 4 identifiers (First name, Surname, DOB and Hospital (or NHS or Unique ID number) and are signed by the blood taker.

Complete all relevant sections of the request - including any 'special requirements' or 'weeks pregnant'.

In the event of a Massive Blood Loss or Massive Obstetric Haemorrhage, refer to the Blood Policy. Please note that the Trust escalates adult/paediatric and obstetric massive blood loss via Switchboard and the terminology used is vital for correct escalation purposes. The term MBL and MHP – major haemorrhage protocol are interchangeable however you must specify the correct terminology with Switchboard to avoid delay in blood provision.

x2 Adult and x1 Neonate Emergency O negative units are available in the Emergency fridge in the Pathology corridor. **Please note** - these units are NOT universally compatible and should only be used in an extreme emergency/risk to loss of life. The access code to the fridge is communicated to the portering team and captured in competence for all having Blood Collection training. The laboratory can also help with the release of these flying squads units in an emergency.

Ensure the laboratory is informed if these units are taken so that they can be replaced as soon as possible. If the laboratory is not informed, this could cause a delay in blood provision for further critical emergencies.

On the receipt of a crossmatch sample the laboratory are able to provide uncrossmatched ABO / Rh (D) group compatible units within 5 minutes. If an historic group is available, fully compatible units are available in 40 minutes (providing no grouping anomalies or atypical antibodies being detected that will need further investigation, and the laboratory is informed of the critical urgency to process the sample as a priority). If an historic group is not available the laboratory will ask for a 'group check' sample. Send a porter to the laboratory to collect a yellow crossmatch tube and re bleed the patient.

## Microbiology

Urgent examinations during the normal working day can be carried out at The Princess Alexandra Hospital between 8.30 am and 5 pm Monday to Friday, if the requesting doctor calls the laboratory on ext. 7138 / 7353.

If processing urgent samples are required Saturday / Sunday and Bank holidays between 8.30 am and 5.00pm see table below – Microbiology out of hours service is temporarily outsourced due to a reduced number of staff available to support rota.

**Microbiology out of hours samples**

**Everyday from 5pm until 8.00am**

Urgent sample types being processed are shown in the table below. Samples will be sent to referral lab (HSL) for testing.

**Weekends & Bank Holidays 1pm – 5pm**

PAH Microbiology on-call staff will be available to process urgent samples. Please call switchboard and request Microbiology BMS to process urgent samples during these times only.

|  |  |
| --- | --- |
| Monday – Friday | Saturday/ Sunday/ Bank Holidays |
| 5.00pm – 10.00 pm | 5.00pm – 10.00pm |
| Urgent urines on patients < 12 months old  CSFs  Urgent tissues  Urgent fluids/ associated swabs | Urgent urines on patients < 12 months old  CSFs  Urgent tissues  Urgent fluids/associated swabs |
| 10.00pm – 8.00 am following day | 10.00pm – 8.00 am following day |
| Urines and sterile fluids / tissues will **NOT** be processed. Place in fridge in ED if microscopy required by 9.00 am  ONLY CSFs will be processed | Urines and sterile fluids / tissues will **NOT** be processed. Place in fridge in ED if microscopy required by 9.00 am  ONLY CSFs will be processed |

**Contact details /mobile number for results MUST be written on the request form**

Procedure after 5pm:

1. Use of Alertive for blood sciences to inform them a sample is being sent for urgent testing.

Use Alertive biochemistry during on-call

Use Alertive haematology during on-call

Use Alertive for BT - Phone 2222 for major haemorrhage then bleep #324

1. Ward/requesting Dr. to call HSL to notify them of a sample being sent.

* **Halo level 3 - 02039081334 or ext 3311** (for all samples-CSFs, tissues, fluids, swabs etc.)
* **Halo level 4 – 02039081390 or ext 3400** for urines only.

Information to give HSL – lab name, patient name, specimen type and test type.

1. Take sample to Main Pathology specimen reception B23 and drop off sample.
2. **Results will be issued verbally to the requesting doctor from the HSL laboratory. Results will be available on ICE the following day. Please do not ring the Blood Sciences laboratory we will not be able to access the results.**

On Saturday mornings the laboratory is staffed between 8.30 am to 12.00pm for urgent samples or result enquiries by calling ext. 3166/7353 or via switchboard.

After this time the on call Microbiology BMS can be contacted via switchboard.up to 5pm on weekends/ bank holidays.

On Sunday mornings the on-call Microbiology BMS is usually in the laboratory between 10.00am and 12.00 pm or contactable via switchboard. After this time the on call Microbiology BMS can be contacted via switchboard.up to 5pm on weekends and bank holidays

Specimens taken at night are processed the next morning. (except Sunday unless arranged with BMS) There is a fridge in ED for samples taken out of hours than fall outside the period of when processing available. i.e urines and fluids after 22.00 hrs will be processed urgently at 8.30 the following morning (except Sunday unless arranged with BMS)

Samples which will **not** be processed out of hours are:

* Stools
* Sputum
* TB investigation
* HVS (unless Gonorrhoea culture is required)
* Ulcers, Bedsores etc.
* Screening samples i.e. MRSA
* HIV test (unless there is an urgent clinical need-see above)
* HBsAg and HepC antibodies (unless there is an urgent clinical need – see above)

This provides a guideline. If a specimen is considered urgent, the merit of the request should be discussed with the consultant pathologist on call.

A Consultant Microbiologist is available via switchboard for clinical advice out of hours.

# Microbiology

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**Microbiology**

## Contacts

Consultant Microbiologist Dr S. Visuvanathan 01279 827140

Consultant Microbiologist in Microbiology Dr. P Sajaan 01279 444543

Specialty doctor in Microbiology Dr A Karunasagar 01279 978608

Lead BMS Ms D. Orriss / M Ricardo Davis 01279 978856 / 01279 978607

Department Secretary Ext 3101

Microbiology enquiries and results Ext. 7138

Main Laboratory Ext. 7353 / 3166

Infection Control Ext. 7139

## Microbiology Advice

Please primarily use extension 7138 for clinical advice

### Clinical

Dr S Visuvanathan 9:00 - 17:00 Ext 7140 /7138

(Out of hours via switchboard)

Dr. P Sajaan 01279 444543

Dr A Karunasagar 01279 978608

### Microbiological

Ms D Orriss / Ricardo Davis 08:30 - 17:00Ext 2726/7138

### Prevention and Control of Infection

Dr S Visuvanathan 9:00 - 17:00 Ext 7140 / 7138

Ms J Kirsch 9:00 - 17:00Ext 2117 & LRP

Out of hours, there is an Infection Control Nurse available via switchboard who will contact Dr Visuvanathan if required.

## Microbiology Routine Investigations

**Microbiology Test Repertoire**

The following general criteria should be followed with samples for Microbiological investigation:

1. All specimens should be transported to the department as soon as possible and definitely within 4 hours.
2. If specimens (except blood cultures) are taken out of laboratory hours then they must be kept in a fridge at +4ºC and transported to the laboratory immediately the following day. There is a fridge located in the emergency department to store urgent fluids received after 10pm. It is advised only to take samples when transport to the laboratory is not delayed unless absolutely necessary i.e. when changing a dressing, before antibiotics given etc. Samples where a fastidious organism is likely to be implicated may require specific transport media /storage conditions. Please ensure correct transport media/storage conditions are used to maximise likelihood of isolation of organism.
3. Blood cultures should be transported to the laboratory immediately after taking to ensure minimal delay in being incubated. Alternatively, they must be loaded on to the analyser located in ED.
4. With all blood samples (except blood cultures) the laboratory requires 1ml of serum antibody, antigen or assay. Therefore, it is desirable to obtain a 6ml blood sample.
5. Blood specimens in EDTA must reach the Department within 3 hours of being taken.
6. Stated turnaround times for serology tests may be longer if a positive result is obtained on initial testing. This is due to the need to perform confirmatory testing.
7. The sample volume of cerebrospinal fluid must be greater than 0.2ml.
8. Faecal specimen containers should be half filled (this is to stop rupture of the specimen container due to excessive gas production by faecal bacteria). If a large number of tests are required then send multiple specimens.
9. Pus and aspirates are always preferable to transport swabs and should be sent in sterile 30ml containers. Do not use the 60ml containers with plastic lids as they usually leak.

1. The following specimens will not be tested

* Unlabelled or inadequately labelled specimens
* Specimens received in non-sterile containers
* Specimens received in formaldehyde
* Urinary Catheter Tips
* Toilet tissue or nappy soiled with faeces
* Rectal swabs (except for rectal wound infection investigation or screening)

1. Please include full and complete clinical details, including details of any foreign travel.
2. Please ensure arrangements are made to maximise likelihood of isolation of organism' or comment to that effect as fastidious organism may be affected by delay of production to processing or storage conditions.
3. Mycology: Skin, nail and hair samples can be tested for fungal infection

Clean the area with a 70% alcohol wipe before sampling, this minimizes contamination and is an aid to microscopy if greasy ointments or powders have been applied

Skin scrapes, nail clippings and small hair pieces should be taken and placed in a sterile universal or Dermapak, and sent to the laboratory as soon as possible. Samples can be stored at room temperature before transportation.

Please send as much material as possible to allow a full investigation to be completed to assist with a correct diagnosis.

Suggestions for taking samples:

Skin samples: using a sterile scalpel blade scrape the edge of the lesion and collect the skin scrapes into a dermapak, fold up and seal or alternatively onto a clean piece of paper, and then transfer this into a sterile universal.

* Nail: If possible, collect the subungual debris in addition to nail clippings. Sample the discoloured, dystrophic or brittle parts of the nail only, sampling as far back as possible from the distal part of the nail.
* Hair: Pluck hairs from the affected area with forceps (infected hairs come out easily) and scrape the scalp with a scalpel. Preferably, the sample should include hair roots, the contents of plugged follicles and skin scales. Hair cut with a scissors is unsatisfactory as the focus of infection is usually below or near the surface of the scalp.
* Please note: we do NOT provide Dermapaks. Should you wish to use these you will need to source and purchase these yourselves. Suppliers include Amazon, Midmeds, MedicalWorld amongst others

## Microbiology Diagnostic Tests

The following table lists the diagnostic tests available within the Microbiology Department. However, the duty Consultant Microbiologist should be contacted if microbial disease of unusual aetiology is suspected.

This is not an exhaustive list of tests available. Please contact the department for further information if required.

Sensitivity testing is carried out using EUCAST (European committee on Antimicrobial Sensitivity Testing) guidelines with the exception of a few topical sensitivities whereby no guidelines are available.

All tests available to request are listed below. Where tests are referred the referral laboratory used are listed within the test information

| **Specimen** | **Tests** | **Container & Sample Volume** | **Turnaround Time  (Working days from receipt)** | **Notes/Referral Laboratory** |
| --- | --- | --- | --- | --- |
| Bacteraemia | | | | |
| **Blood Cultures** | Gram stain culture and sensitivity | 5-10ml blood in BacT/ALERT Aerobic (blue top) and Anaerobic (purple top) bottles or yellow top for paediatrics only (max.) 4mls blood | Positive Results telephoned and entered on computer for access via EHR / ICE as soon as they are available.  Negative report issued at 48 hours or 36 for paediatric. All bottles are incubated for up to 5 days (10 if ?SBE or HACEK organisms suspected) | Blood culture packs MUST be used when submitting these samples |
| Meningitis / Encephalitis ***– please phone department or contact on call BMS*** | | | | |
| **Cerebrospinal Fluid (CSF)** | Gram stain Red cell count Differential white cell count Culture and sensitivity | Sterile 30ml universal container (white top)  Sequence Specimens 1, 2 & 3 >0.2ml | Microscopy: <2 hours  Bacterial Culture: 7 days | Specimen 1 & 3 (2 to biochemistry with some transferred to a glucose tube)- must be processed within 2 hours of collection (as cells deteriorate) Out of hours samples will be referred to HSL for processing Fungal & Mycobacterial investigation performed at the discretion of Consultant Microbiologist |
| **Cerebrospinal Fluid (CSF) Blood** | PCR for:  N. meningitidis  Str. Pneumoniae | Sterile 30ml universal container (white top). (CSF>0.2ml) Blood (EDTA>4ml) | Telephoned results if positive | Referred to:  Meningococcal Reference Unit, Manchester medical microbiology partnership, PO Box 209, Clinical services building, Manchester Royal Infirmary, Manchester, M13 9WZ |
| **Cerebrospinal Fluid (CSF) Blood** | PCR for:  Adenovirus, CMV, Enterovirus, HSV, VZV | Sterile 30ml Universal Container (white top).  (CSF>0.2ml) Blood (EDTA>4ml) | 3 - 5 days | Only performed if clinically indicated and raised WBC in CSF or at the discretion of the Consultant Microbiologist  Referred to  Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| Respiratory Tract Infection | | | | |
| **Expectorated Sputum**  **Nasopharyngeal Aspirate**  **Bronchial Aspirate** | Culture and sensitivity | Sterile 60ml universal container | 7 days | Do not send specimens in “trap” containers  Salivary samples are not suitable. |
| **Expectorated Sputum**  **Nasopharyngeal Aspirate**  **Bronchial Aspirate**  **Pleural fluid** | Auramine Phenol stain, culture and sensitivity for *Mycobacterium* spp. | Sterile 60ml universal container | Microscopy: 1 - 2 days  Culture: up to 6 weeks  If negative – this may be extended if liquid culture contamination occurs | Do not send specimens in “trap” containers  Salivary samples are not suitable.  Referred to Mycobacterium reference laboratory  Colindale UKHSA  61 Colindale Avenue  London  NW9 5HT |
| **Nasopharyngeal Aspirate** | Respiratory Viral Screen inc. RSV | Sterile 60ml universal container | Sample will be tested by PCR. All positive results will be telephoned when available | Expel the sample from the NG tube into the container before sending  Sputum is not a suitable specimen |
| **Pleural Fluid** | Gram stain  Culture and sensitivity | Sterile 30ml universal container (white top) | Microscopy:  Result available 1 - 2 days but reported on completion of culture. Abnormal microscopy results telephoned  Culture:  2 - 6 days | Due to Health and Safety regulations it is not possible to perform white cell counts. |
| **Urine** | Legionella pneumophila/Strept. pneumoniae antigen detection | Sterile 30ml universal container (white top). | <24 hours | Only processed if full relevant clinical details given |
| **Nose and throat**  **(Respiratory viral screen/flu screen)** | Respiratory PCR including influenza A and B, Parainfluenzae, Rhinovirus, RSV | Nose and throat in Viral Transport Media | <48 hours | Please note these tests are currently not UKAS ISO 15189:2022 accredited |
| **Throat swab** | Culture and sensitivity for:  Streptococci A,C&G) | Transport swab (blue top) | Culture:  2 - 4 days |  |
| **Throat swab** | Culture and sensitivity for C. diphtheriae | Transport swab (blue top) | Culture:  3 - 7 days | Referred to  61 Colindale Avenue  London  NW9 5HT |
| **Wound Infection** | | | | |
| **Aspirates, bone, pus and tissue** | Gram stain  culture and sensitivity | Sterile 30ml Universal Container | Microscopy:  Result available 1-2 days but reported on completion of culture. Abnormal microscopy results telephoned  Culture:  2–6 days | These are always preferable to swabs and are the ideal specimen to collect.  These samples should be collected using aseptic technique. Cell counts are available on request for prosthetic joint fluids  Out of hours samples will be referred to HSL for processing |
| **Ascites (?SBP)** | Cell count  Culture and sensitivity | Adult blood culture bottle (10ml)  EDTA for cell count | Cell count: 2 hours  Culture Negative report issued at 48 hours. All bottles are incubated for up to 5 days | This is preferred collection technique for optimal results and TAT  Out of hours samples will be referred to HSL for processing |
| **Corneal scrape** | Gram stain  Culture and sensitivity | Smear scraping onto clean labelled microscope slide and place in slide box.  Spread scraping onto Blood, Chocolate and Sabouraud agar plates. | Microscopy:  1 day  Culture:  2–6 days | Agar plates are available from Microbiology Dept.  Ensure that all plates and slides are labelled. |
| **Ear swabs** | Culture and sensitivity | Transport swab (blue top) | Culture:  2–6 days |  |
| **Eye swab - chlamydia** | Chlamydia/ N.gonorrheae detection | Chlamydia collection kit | 8 days | Fluorescent dye will interfere with testing.  Currently referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| **Eye swabs** | Culture and sensitivity | Transport swab (blue top) | Microscopy:  Result available 1 - 2 days but reported on completion of culture  Culture: 2 - 6 days |  |
| **Swabs – virus PCR** | HSV/VZ PCR | Swab in Virus Transport Medium (VTM) | 5-7 days | VTM is available from Microbiology Department  Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Intra-vascular line tips**  **Wound drain tips**  **Extra-vascular line tips** | Culture and sensitivity | Sterile 30ml universal container | Culture:  2 - 6 days | Aseptic technique should be used when cutting the tip. Please place the tip end at the bottom of the universal container |
| **Ulcer Swabs** | Culture and sensitivity | Transport swab (blue top) | Culture:  2 - 6 days | Ulcer swabs usually contain a large number of different micro-organisms.  Only pathogenic micro-organisms are reported with ID & Sensitivity. Samples will only be processed if clinical details indicate that this is required. See venous ulcer guidelines |
| **Ulcer Swabs** | Culture and sensitivity | Transport swab (blue top) | Culture:  2 - 6 days | Ulcer swabs usually contain a large number of different micro-organisms.  Only pathogenic micro-organisms are reported with ID & Sensitivity. Samples will only be processed if clinical details indicate that this is required. See venous ulcer guidelines |
| **Wound swabs (deep seated):**  **Abscesses**  **Bites**  **Carbuncles**  **Furuncles**  **Post-Op Sites** | Culture and sensitivity for:  Aerobic and anaerobic micro-organisms | Transport swab (blue top) | Culture:  2 - 6 days | Full clinical details are vital in the diagnosis of wound infection |
| **Wound Swabs (superficial):**  **Burns (from GPs)**  **Cellulitis**  **Erysipelas**  **Erysipeloid**  **Erythrasma**  **Folliculitis**  **Impetigo**  **Scalded skin** | Culture and sensitivity | Transport swab (blue top) | Culture:  2 - 6 days | These swabs should be taken from superficial infection sites.  Full clinical details are vital in the diagnosis of wound infection. |
| **Screening Swabs** | | | | |
| MRSA screen | Culture and sensitivity for:  MRSA | Transport swab (blue top) | Culture:  1-3 Days | Refer to Ward Infection Control Protocol |
| MSSA screen | Culture and sensitivity for:  MSSA | Transport swab (blue top) | Culture:  1-3 Days |  |
| Nose swab | Culture and sensitivity for:  *Staph aureus*  Streptococci (A, C & G) |  | Culture:  1 – 2 days |  |
| Throat swab | Culture and sensitivity for:  *N.meningitidis* | Transport swab (blue top) | Culture:  2–6 Days | May be useful for contact screening following laboratory confirmed case of meningitis caused by *N.meningitidis* |
| Faeces/rectal swab | VRE screening | Sterile 30ml universal container (blue top with spoon to aid collection)/transport swab (blue top) | Culture:  1 - 3 days | Contact infection control to discuss if required |
| Faeces/rectal swab | CPO screening | Sterile 30ml universal container (blue top with spoon to aid collection)/transport swab (blue top) | Culture:  1 - 3 days | Contact infection control to discuss if required |
| LVS/anorectal swabs | Group B streptococcus screening | Transport swab (blue top) | Culture:  2 - 3 days | Not routine screening, for specified patients only |
| **Genital Tract Infection – Female** | | | | |
| High Vaginal swab  Endocervical swab  Urethral swab  Vulval swab | Culture and sensitivity | Transport swab (blue top) | Microscopy:  Result available 1-2 days but reported on completion of culture  Culture:  2 - 6 days | Culture for *N. gonorrhoea* only performed on endocervical swabs received in transport medium  Microscopy currently not available routinely |
| Endocervical Swab  Urethral Swab | Chlamydia / N.gonorrheae Detection | Chlamydia collection kit | 3 - 6 days | Heavily blood-stained specimens may affect the performance of this assay.  Vaginal swabs may give equivocal results and are not recommended  Currently referred to Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| Lesion Swab | PCR for Herpes 1 & 2 virus | Swab in Virus Transport Medium (VTM) | 5 - 7 days | VTM is available from Microbiology Department  Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| **Genital Tract Infection – Male** | | | | |
| Penile Swab  Urethral Swab | Gram stain  Culture and sensitivity | Transport swab (blue top) | Microscopy:  Result available 1-2 days but reported on completion of culture  Culture: 2 - 6 days | Penile swabs will not be processed in the absence of relevant clinical details. If patient is catheterised a urine should be sent instead. |
| Urethral Swab | Chlamydia/ N.gonorrheae detection | Chlamydia Collection Kit | 3 - 6 days | Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London, E1 2ES |
| Rectal swab | Chlamydia / N.gonorrheae Detection | Chlamydia Collection kit | 3-6 days | Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| Lesion swab | PCR for Herpes 1 & 2 virus | Swab in Virus Transport Medium (VTM) | 5-7 days | VTM is available from Microbiology Department  Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| **Urinary Tract Infection** | | | | |
| Mid-Stream Urine  Catheter Specimen Urine | Microscopy (automated)  Culture and sensitivity (where indicated) | Sterile universal containing boric acid (red top). If there is a small sample volume use the 30ml sterile universal container (white top) | Microscopy:  1 day  Culture:  2 - 6 days | Urinary catheter tips are not suitable (please send urine sample.  Fill container to line.  Boric acid is bactericidal at high concentration so please send > 10ml. |
| Suprapubic aspirate | Microscopy  Culture and sensitivity | Sterile 30ml universal container (white top).  Do **not** use the sterile universal containing boric acid (red top) | Microscopy:  1 day  Culture:  2 - 6 days | Do not send in boric acid.  Please inform lab if you intend to send an SPA specimen |
| Terminal urine | Microscopy for *Schistosoma haematobium* | Sterile 30ml universal container.  **Do not** use the sterile universal containing boric acid (red top) | Microscopy:  2 days | Do not send in boric acid.  Specimen should be taken at midday (preferably after exercise) |
| Early morning urine | Culture and sensitivity for Mycobacterium spp. | Sterile 250ml container.  Do **not** use the sterile universal containing boric acid (red top) | Culture:  6 weeks | EMU samples must contain the contents of the first urine voided in the morning, collected over 3 consecutive days into separate containers. |
| Urine | CMV PCR | Sterile 30ml universal container.  Do **not** use the sterile universal containing boric acid (red top) | 5 - 7 days | Do not send in boric acid.  Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| **Gastro-intestinal Tract Infection** | | | | |
| Faeces (foreign travel to endemic areas) | Culture and sensitivity for:  *Vibrio cholerae* | Sterile 30ml universal container (blue top with spoon to aid collection) | Culture:  2 - 6 days | This test is performed in addition to the Faeces routine (see above)  It is important to state where the patient has travelled. |
| Faeces | Culture and sensitivity for:  Yersinia enterocolitica | Sterile 30ml universal container (blue top with spoon to aid collection) | Culture:  2 - 6 days | Please give full clinical details (e.g. Hx of mesenteric adenitis, Hx of pig associated food poisoning, etc.) |
| Faeces - routine | Microscopy for:  White and red cells  Faecal parasites  *Cryptosporidium* spp.  Culture and sensitivity for:  *Salmonella* spp  *Shigella* spp  *E. coli* O157  *Campylobacter* spp | Sterile 30ml universal container (blue top with spoon to aid collection) | Microscopy:  Result available 1 - 2 days but reported on completion of culture  Culture:  2 - 6 days | Specimen container should be half full (do not overfill).  It is very important to provide full clinical details, Hx of foreign travel, Hx of food poisoning, etc.  Microscopy currently not routinely available |
| **Faeces** | Helicobacter antigen | Sterile 30ml universal container (blue top with spoon to aid collection) | 7 days | The patient should not have taken PPI within 2 weeks prior to testing or antibiotics within 4 weeks |
| **Faeces** | Cl. difficile toxin detection (toxin A and B) | Sterile 30ml universal container (blue top with spoon to aid collection) | < 24 hours | Only performed on unformed or liquid stools from the following patient groups:  All in patients >2yrs  GP patients > 65yrs  Patient with Hx antibiotic therapy or  Hx pseudomembranous colitis |
| **Faeces** | Rotavirus antigen detection | Sterile 30ml universal container (blue top with spoon to aid collection) | 1 - 3 days | Only performed on inpatient samples from children under 3yrs unless specifically requested |
| **Faeces** | Norovirus Immunocard screen/ PCR | Sterile 30ml universal container (blue top with spoon to aid collection) | In patient <24 hours  Community 2 – 6 Days | In outbreaks a maximum of 5 samples will be referred. |
| **Sellotape Slide** | Microscopy for *Enterobius vermicularis* (Threadworm) | Sellotape Slide or perianal swab in saline | 1 - 3 days | It is important that the specimen includes epithelial cells from the perianal area. |
| **Parasites** | Parasite identification | Sterile 30ml Universal Container | 1 - 3 days |  |
| **Antral Biopsy** | Culture and sensitivity for *Helicobacter pylori* | 5ml Sterile saline | Culture 5 - 7 days  Sensitivity 14 days | Available from Microbiology Department  Referred to  61 Colindale Avenue  London  NW9 5HT |
| **Mycology** | | | | |
| **Skin Scrapings** | Microscopy and culture for fungal dermatophytes | Skin scrapes in sterile universal or Microtrans envelopes | Microscopy:  Up to 1 week  Culture:  2 - 3 weeks | Samples are batched and tested once / twice weekly |
| **Nail** | Microscopy and culture for fungal dermatophytes | Nail scrapes in sterile universal | Microscopy:  Up to 1 week  Culture:  2 - 3 weeks | Samples are batched and tested once / twice weekly Include invaded tissues, ideally base of nail. |
| **Hair** | Microscopy and culture for fungal dermatophytes | Hair/scalp scales transported in “Mycotrans” envelopes, for larger specimens use sterile universal | Microscopy:  Up to 1 week  Culture:  2 - 3 weeks | Samples are batched and tested once / twice weekly |
| **Miscellaneous** | | | | |
| **I6s PCR (Bacteria)** | Detection of bacterial DNA from sterile fluids and tissues  (only available on discussion with Consultant Microbiologist) | Tissue/fluid | 5 days | Microbiology Dept  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |

### Antibiotics and Serology

| **Tests** | **Container and Sample Volume** | **Turnaround Time  (Working days from receipt)** | **Notes/Referral Laboratory** |
| --- | --- | --- | --- |
| **Antibiotic Assays** | | | |
| **Amikacin** | Clotted blood in plain container (yellow top with gel or red top)  Minimum volume 1.0 ml serum | Performed by biochemistry daily | Reference Ranges  Amikacin Pre-dose <10mg/L  Amikacin Post-dose 20-25mg/L |
| **Vancomycin** | Clotted blood in plain container (yellow top with gel or red top)  Minimum volume 1.0 ml serum | Performed by biochemistry daily | Reference Ranges  Vancomycin Pre-dose <10 mg/l  Vancomycin Post-dose 20-40 mg/l |
| **Gentamicin** | Clotted blood in plain container (yellow top with gel or red top)  Minimum volume 1.0 ml serum | Performed by biochemistry daily | Gentamicin levels are interpreted in line with the clinical picture at the time sample taken; following Trust antibiotic guidelines. |
| **Other antibiotic assays other than gentamicin** | Clotted blood in plain container (yellow top with gel or red top)  Minimum volume 0.5ml | Referred to antibiotic reference laboratory, Southmead, Bristol | If same day result required please discuss with laboratory |
| **Serology** | | | |
| **Acanthamoeba culture** | Corneal scrape/contact lens | 5 - 7 days | London School of Hygiene & Tropical Medicine  Keppel Street  Tottenham Court Road  London  WC1E 7HT |
| **Adenovirus PCR** | Nose/throat swab | 2 days |  |
| A**moebic IFAT** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 7 days | The Hospital for Tropical Diseases  3rd floor  Mortimer market  Capper street  London  WC1E 3BG |
| **Anti DNAse B** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum |  | Norfolk & Norwich University Hospital Microbiology Department  NRP Innovation Centre  Norwich Research Park,  Colney, Norwich, NR4 7GJ |
| **ASO** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Tested at PAH |
| **Aspergillus antibodies** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 - 10 days | Mycology Reference Lab  UKHSA South West Laboratory  Myrtle Road  Kingsdown  Bristol  BS2 8EL |
| **Avian precipitins** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 days | Norfolk & Norwich University Hospital Microbiology Department  NRP Innovation Centre  Norwich Research Park  Colney, Norwich, NR4 7GJ |
| BK Virus | Serum | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES | 3-5 days |
| **Bordetella antibodies** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 5 - 10 days | Bacteriology Reference Laboratory  UKHSA Centre for Infections  61 Colindale Ave  London |
| **Bordetella PCR** | Pernasal swab (< 1 year old) |  | UKHSA  Box 236  Addenbrookes Hospital  Hills Road  Cambridge  CB2 2QW |
| **Borrelia Antibodies** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 - 10 days | Rare and Imported Pathogens Laboratory (RIPL), Public Health England, Porton Down, Salisbury, Wiltshire SP4 0JG, UK |
| **Brucella Serology** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 14 - 21 days | Clinical Microbiology & UKHSA collaborating unit (BRU)  Liverpool |
| **Campylobacter Antibodies** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 days | UKHSA Laboratory  61 Colindale Avenue  London  NW9 5HT |
| Chlamydia (LGV) | Genital / rectal swabs |  | UKHSA Laboratory (STRBU)  61 Colindale Avenue  London  NW9 5HT |
| C**MV IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Tested at PAH |
| **CMV IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Tested at PAH |
| **CMV PCR** | Urine (500 ul)  Plasma (500 ul) | 3 - 5 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street, London E1 2ES |
| Cryptococcal/candida Antibodies | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 3 - 5 days | Mycology Reference Laboratory  National Infection Services  UKHSA South West Laboratory  Science Quarter,  Southmead Hospital  Bristol  BS10 5NB |
| Dengue/Ricketsia | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 - 10 days | Rare and Imported Pathogens Laboratory (RIPL), Public Health England, Porton Down, Salisbury, Wiltshire SP4 0JG, UK |
| **EBV antibodies (EBV VCA IgG, EBV VCA IgM, EBV ENA-1 IgG)** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Tested at PAH |
| **EBV PCR** | EDTA for PCR | 7 - 10 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building, 80 Newark Street  London E1 2ES |
| Enterovirus PCR | CSF (250ul)  Stool (360ul liquid or pea size in non-liquid) | 2 - 3 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| Farmers Lung | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum |  | Mycology Reference Laboratory  National Infection Services  UKHSA South West Laboratory  Science Quarter,  Southmead Hospital  Bristol  BS10 5NB |
| H**epatitis A IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Hepatitis A IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Tested at PAH |
| **Hepatitis B**  **surface antigen** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Initial screening test at PAH. confirmation sent to  Virus Reference Laboratory  61 Colindale Avenue  London, NW9 5HT |
| **Hepatitis B**  **e antigen** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 days | Virus Reference Laboratory  61 Colindale Avenue  London, NW9 5HT |
| **Hepatitis B**  **e antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 days | Virus Reference Laboratory  61 Colindale Avenue  London, NW9 5HT |
| **Hepatitis B**  **core IgM antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 days | Virus Reference Laboratory  61 Colindale Avenue  London  NW9 5HT |
| **Hepatitis B**  **core antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Tested at PAH |
| **Hepatitis B**  **surface antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Tested at PAH |
| **Hepatitis B DNA/viral load** | EDTA – 1.1 mls plasma ( 6ml purple EDTA) | 10 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Hepatitis C Antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Initial screening test at PAH. confirmation sent to  Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Hepatitis C (PCR) viral load/genotyping** | Blood (EDTA) >4ml Minimum volume | 5 - 7 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Hepatitis D screen** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 0.5ml | 5 - 7 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Hepatitis E IgG/IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Tested at PAH |
| **HIV 1 & 2 Ag/Ab** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 days | Initial screening test at PAH. confirmation sent to  Blood borne Virus Reference Laboratory  61 Colindale Avenue  London  NW9 5HT |
| **HIV Viral Load** | Blood (EDTA) >4ml Minimum volume 1.0 ml | 3 - 5 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **HIV PCR for maternal transmission** | Blood (EDTA) >1ml Minimum volume 0.5ml | 10 - 14 days | Blood borne virus Reference Laboratory  Colindale  London |
| **HSV PCR** | In VTM (Virus Transport Medium) | 3 - 5 days | VTM is available from Microbiology Department  Referred to Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **HTLV** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum |  | Virus reference laboratory UKHSA  Centre for Infections  61 Colindale Ave  London  NW9 5HT |
| **Hydatid Abs** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 days | The Hospital for Tropical Diseases  3rd floor  Mortimer market  Capper street  London  WC1E 3BG |
| **JC virus** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 0.5ml  CSF |  | Virus Reference Laboratory  61 Colindale Avenue  London  NW9 5HT |
| L**eptospira antibodies/ PCR** | Clotted blood in plain container (yellow top with gel or red top) | 7 - 10 days | Rare and Imported Pathogens Laboratory (RIPL), Public Health England, Porton Down, Salisbury, Wiltshire SP4 0JG, UK |
| M**easles IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 10 - 14 Days | Tested at PAH |
| **Measles IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 - 10 Days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Meningococcal antibodies/PCR** | EDTA / CSF / Joint fluid | 2 - 3 days | Meningococcal Reference Unit  Manchester medical microbiology partnership  PO Box 209  Clinical services building,  Manchester Royal Infirmary  Manchester, M13 9WZ |
| **Mumps IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 2 - 4 Days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Mumps IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 - 10 Days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| Mycoplasma PCR | Nose/throat in VTM  Sputum  BAL  (only available after discussion with Consultant Microbiologist) | 7 - 10 days | HSL,  The Halo  1 Mabledon Place,  Kings Cross,  London  WC1H 9AX |
| P**arvovirus B19 IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7-10 Days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor  Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Parvovirus B19 IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7-10 Days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building  80 Newark Street  London E1 2ES |
| **Respiratory Viral PCR including RSV** | In VTM (Virus Transport Medium)  NPA | <48 hours | Tested at PAH |
| **Rubella IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Tested at PAH |
| **Rubella IgM** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Tested at PAH |
| **Schistosoma Abs** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 days | The Hospital for Tropical Diseases  3rd floor  Mortimer market  Capper street  London  WC1E 3BG |
| **Syphilis antibody** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | Screening tests:  2 - 4 days  Confirmation  6 - 8 days | Initial screening test at PAH. confirmation sent to  UKHSA South West Laboratory  Myrtle Road  Kingsdown  Bristol  BS2 8EL |
| T SPOT TB test | Blood samples in green top tubes (lithium heparin or sodium heparin) – samples must be taken Monday or Wednesday only and must reach the microbiology department before 16:30.  Recommended blood volume: Adults and children ≥ 10 years of age: 6 mL  Children ≥2 to <10 years of age: 4 mL Children <2 years of age: 2 mL  Please note: The above guidelines may be insufficient in immunocompromised patients with low numbers of PBMCs. Therefore, it may be advisable to collect double the recommended blood volume for immune-compromised patients.  Patients will be by phlebotomy staff. Samples will be brought to lab from outpatient area by phlebotomy / pre-analytical staff or will arrive on transport from H&E or SMH. The cut off time for off-site phlebotomy is 14.00pm, for phlebotomy at PAH 16.00pm. | 2 - 4 days | Pre-arranged courier to Oxford Diagnostics laboratories |
| T**oxoplasma serology** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 4 - 6 days | Initial screening test at PAH. confirmation sent to  Public Health Wales laboratory  Singleton Hospital  Sgeti, Abertwe, Swansea SA2 8QA |
| **Toxocara antibodies** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | 7 days | Consultant Parasitologist  The Hospital for Tropical Diseases  3rd Floor  Mortimer Market  Capper Street, London, WC1E 6AU |
| **VZV IgG** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum | Pregnant contact:  1 - 2 days  Routine screen:  4 - 6 days | Tested at PAH |
| **VZ PCR**  **(Acute VZV infection)** | Swab of vesicle fluid | 3 - 10 days | Virology, Dept of Infection  Barts Health NHS Trust  3rd Floor Pathology and Pharmacy Building, 80 Newark Street  London E1 2ES |
| **Zika virus** | Clotted blood in plain container (yellow top with gel or red top) Minimum volume 1.0 ml serum  EDTA  Urine |  | Rare and Imported Pathogens Laboratory (RIPL), Public Health England, Porton Down, Salisbury, Wiltshire SP4 0JG, UK |

All requests marked URGENT or PLEASE PHONE will be phoned ASAP. A preliminary report will also be available on the ICE.

Blood Cultures are phoned as soon as they become positive if assessed to be clinically significant. A preliminary report of the Gram stain will also be available on ICE.

If further investigations are required, the reports will be delayed.

**HIV requests do not require a separate form but require a signature from the attending clinician stating patient has been counselled. (Please see General Information)**

## Sample Collection

All samples should be taken prior to commencement of antibiotic therapy

|  |  |
| --- | --- |
| **Specimen type** | **Collection Requirements** |
| Urine | Use sterile containers with boric acid (red top) |
| Sputa and faeces | In sterile pots with screw lids.  Do NOT overfill. |
| Tissue or pus | Preferable to swabs in sterile pots without formalin. |
| Swabs | Do NOT use dry swabs, need transport medium. |
| AFB investigation | The laboratory requires three consecutive early morning samples of sputum or urine for AFB investigations. |
| Ascetic fluids | Collection into blood-culture bottles preferred.  Use EDTA tube for cell count. |
| Joint fluids | Collection into blood-culture bottles preferred.  Use sterile universal for cell count (prosthetic joints only) and Gram stain |
| Other Body fluids i.e. pleural, joint fluids | Use sterile pots with screw lids.  DO NOT use blood culture bottles.  It is important to ensure all lids are securely tightened to minimize leakage or contamination of sample. |
| Skin scraping or nail clippings | Use sterile pots or dermatophyte collection kits.  Do NOT use folded up pieces of paper or envelopes. |

### Special Procedures

**Paediatric blood culture bottles**

Are available and consist of one yellow top bottle per set.

Paediatric bottles should be inoculated with 3 - 5 ml of blood.

**Adult sets**

Consist of 2 bottles; one blue top and one purple top per set.

Adult bottles should be inoculated with 5 - 10 ml of blood.

### Antibiotic levels:

Detailed guidelines are available in the Clinical Guidelines folder

Should not be taken before the patient has received 24 hours of therapy (usually 3 doses).

Levels must be taken just before and one hour after the dose.

Accurate timing of doses and collection of samples is most important and the samples clearly labelled PRE and POST Gentamicin and Vancomycin levels are carried out by the biochemistry department. Other levels can be performed by prior arrangement with the Microbiology department.

# Cellular Pathology

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**Cellular Pathology**

## Information

**Histopathology and Non Gynae Cytology**

Located at the rear of the PAH site in the Michael Letcher Cellular Pathology Building

**Mortuary**

Located on the lower ground floor of the main building

[Click here for PAH Ward Guide](https://www.pah.nhs.uk/our-wards/)

**Enquiries:** 01279 827094 **Email:** [tpa-tr.cellpath@nhs.net](mailto:tpa-tr.cellpath@nhs.net)

## Consultant Pathologists

Dr V. Sundaresan 01279 827 097 Lead Doctor of Pathology

Dr N. Jain  01279 827 098 Head of Department

Dr S. Arif 01279 827 352 Cervical Screening Provider Lead

Dr S. Al-Ramadhani 01279 444 455 ext 3101

Dr P Gopinath01279 827 514 HTA DI

Dr M Mohammed 01279 978 407

Dr R Hasan 01279 827 095

Dr K Sherring 01279 978 410

Dr A Cymerman 01279 827 356

Dr C Waites 01279 978 408

**Lead Biomedical Scientist of Histology:** L. Greenhalgh 01279 827096

**Mortuary Manager**: K. Connolly 01279 978728

## Cancer Diagnostic Services

* **Urology** (including Urine Cytology)
* **Upper GI**
* **Lower GI**
* **Lung Biopsies & resection** (with pleural fluid, bronchial washings, brushings & sputum)
* **Medical Liver**
* **Breast**
* **Gynae**
* **Histology:**
* Colposcopy
* Endometriums (incl. urgent and CWT cases), non CWT uteruses and small ovarian cysts
* CWT (resections/large ovarian cysts)
* **Gynae Cytology (provided by Norfolk and Norwich as of 20/01/2020)**
* **Non Gynae Cytology** (Ascitic fluid, knee aspirate, CSF & others)
* **Lymphoreticular Bone Marrow –** referred to SHIMD at UCLH
* **Head & Neck Pathology** Including Cytology & Thyroid
* **Skin and soft tissue pathology**

A full list of reporting specialities can be obtained on request from the Cellular Pathology Department.

Regular multi-disciplinary meetings are held for all the above cancers with the relevant clinicians

## Histopathology

Specimens sent for histopathological examination should be placed in 10% neutral buffered formalin (NBF), the quantity of which mustbe at least ten times greater than the size of the biopsy, and sent to the laboratory with its request form both clearly printed with patients name and hospital number. **The lids must be correctly fitted.**

Frozen sections **must** be booked in advance by contacting the **laboratory** by telephone or email, with at least 24 hours’ notice. Confirmation will be given after checking pathologist cover for the day; this will be done as soon as practicable. The specimen must be sent fresh without fixative.

All urgent specimens must be marked clearly on the request form. Clinicians are also asked to clearly label specimens that are on a CWT pathway with CWT. The Cellular Pathology request form can be used for all Histology and Non-gynae Cytology samples.

All cellular pathology samples should be requested using ICE and paper requests form are only to be used in downtime situations and are available from trust intranet or general office.

If ICE downtime is experienced contact ext. 7094 for a master copy to be sent or emailed.

Forms for Cytology gynae screening are requested using ICE-NI forms via ICE

Instructions for filling in the request forms - the form must have:

* The correct patients name – matching the patients sample pot/s
* Hospital number
* Date of birth
* Time and date sample taken
* Location
* Consultant name and signature
* Sample description
* LMP if appropriate
* Clinical details
* Alerts – if applicable

Small diagnostic biopsies (urgent) to be reported within 7 days - 90 % compliance as per RCPath guidelines and larger more complicated tissue cases (excisions) requiring more investigative work will be reported within 10 working days. Frozen specimens (intra-operative) are urgent samples and are dealt with as a priority. There is no given TAT for a frozen specimen as these are urgent intra-operative tests, with a result issued; however, the remaining specimen is processed in line with the standard RCPath TATs.

### Range of tests

**Surgical samples:**

Including skins, appendix, gall bladders, colon, breast

**Diagnostic biopsies:**

Including gastric, oesophageal, BMT, cervical, colonic, liver, lung etc.

**Other tests performed:**

* Special stains
* Immunocytochemistry
* Frozen sections (intra-operative)
* HER2 FISH for breast cancers
* Repertoire of tests performed externally (shown in referral tests table below):

| **Test** | **Type of test** | **Location** | **Test/Test and Report** |
| --- | --- | --- | --- |
| ALK1 (lung and lymphoma) | IHC +/- ISH | HSLAD | Test with report |
| Androgen Receptor | IHC | HSLAD | Test only reported in house |
| B&T cell clonality | Molecular | Sarah Cannon | Test with report |
| BAP1 | IHC | HSLAD | Test only reported in house |
| BCL6 | IHC | HSLAD | Test only reported in house |
| BETC | IHC | HSLAD | Test only reported in house |
| BRAF molecular rapid test | Molecular | Sarah Cannon | Test with report |
| CA19 | IHC | HSLAD | Test only reported in house |
| Calcitonin | IHC | HSLAD | Test only reported in house |
| CAM5.2 | IHC | HSLAD | Test only reported in house |
| CD1A | IHC | HSLAD | Test only reported in house |
| CD11c | IHC | HSLAD | Test only reported in house |
| CD31 | IHC | HSLAD | Test only reported in house |
| CD43 | IHC | HSLAD | Test only reported in house |
| CD61 | IHC | HSLAD | Test only reported in house |
| CD99 | IHC | HSLAD | Test only reported in house |
| CK19 | IHC | HSLAD | Test only reported in house |
| CMV | IHC | HSLAD | Test only reported in house |
| DOG1 | IHC | HSLAD | Test only reported in house |
| EBV | IHC | HSLAD | Test only reported in house |
| EGFR IHC | IHC | HSLAD | Test only reported in house |
| EGFR molecular (rapid test) | Molecular | Sarah Cannon | Test with report |
| F13 | IHC | HSLAD | Test only reported in house |
| Factor 8 (vWF) | IHC | HSLAD | Test only reported in house |
| Galectin | IHC | HSLAD | Test only reported in house |
| GCDFP-2 | IHC | HSLAD | Test only reported in house |
| \*GLUT1 | IHC | HSLAD | Test only reported in house |
| Glypican | IHC | HSLAD | Test only reported in house |
| HER2 (gastric) | IHC +/- ISH | HSLAD | Test with report |
| HER2 ISH (breast) | ISH | HSLAD | Test with report |
| HNPCC / MMR | IHC with interpretation | HSLAD | Test with report |
| HPV | ISH | HSLAD | Test with report |
| HSV | IHC | HSLAD | Test only reported in house |
| IGG | IHC | HSLAD | Test only reported in house |
| IMF *(see note 1)* | Externally requested | St Johns Institute of dermatology | Test with report |
| Inhibin | IHC | HSLAD | Test only reported in house |
| KRAS molecular | Molecular | Sarah Cannon | Test with report |
| Mast Cell Tryptase | IHC | HSLAD | Test only reported in house |
| Mesothelin | IHC | HSLAD | Test only reported in house |
| MMR | IHC | HSLAD | Test only reported in house |
| MPO | IHC | HSLAD | Test only reported in house |
| MUM1 | IHC | HSLAD | Test only reported in house |
| MYOD | IHC | HSLAD | Test only reported in house |
| Myoglobin | IHC | HSLAD | Test only reported in house |
| NGS / MGP - genomic (specific tests as outlined in national testing directory and on RMH website – usually dependent on tumour pathway – nationally funded) | Molecular | North London Thames Genomic Lab Hub (Royal Marsden – RMH) | Test with report |
| NKX3 | IHC | HSLAD | Test only reported in house |
| NSE | IHC | HSLAD | Test only reported in house |
| Oncotype DX | Molecular | Genomic Health USA | Test with report |
| P40 | IHC | HSLAD | Test only reported in house |
| P57 | IHC | HSLAD | Test only reported in house |
| PAX2 | IHC | HSLAD | Test only reported in house |
| PDL1 | IHC | HSLAD | Test with report |
| PDL1 Breast | IHC | Poundbury Cancer Institute | Test with report |
| Rapid BRAF | Molecular | Sarah Cannon | Test with report |
| Rapid EGFR | Molecular | Sarah Cannon | Test with report |
| RCC | IHC | HSLAD | Test only reported in house |
| ROS-1 (IHC and ISH) | IHC +/- ISH | HSLAD | Test with report |
| SMM | IHC | HSLAD | Test only reported in house |
| SOX10 | IHC | HSLAD | Test only reported in house |
| STAT6 | IHC | HSLAD | Test only reported in house |
| TB testing *(see note 2)* | Molecular | Micro Department Leeds Royal Infirmary | Test with report |
| TDT | IHC | HSLAD | Test only reported in house |
| Thyroglobulin | IHC | HSLAD | Test only reported in house |
| \*Tissue typing | Molecular | Molecular malignancy laboratory - Addenbrookes | Test with report |
| *\*Treponema pallidum* IHC | IHC | HSLAD | Test only reported in house |

Notes:

\* Denotes test performed outside of the referrals labs ISO accreditation or a lab not currently holding ISO accreditation.

1. IMF is requested by dermatology, the report is added to the LIMS and issued as standard report. The lab provides a despatch facility with no processing of the specimen at PAH. The results are also sent directly to the requesting clinician.
2. TB testing at the reference lab is provided with a 7 day turnaround from receipt.
3. Tissue typing is carried out with a 2 week turnaround from receipt of specimen.
4. IHC tests performed at HSLAD are performed within 2 working days of receipt and despatched back to the requesting laboratory, where the extra tests are reported.
5. IHC tests performed at Addenbrookes are performed within 5 working days of receipt of the request. The extra tests are reported once received back in the lab.
6. ISH tests and IHC with interpretation are performed within 5 working days of receipt test. Report is returned to the lab.
7. Molecular tests at the Sarah Cannon Molecular unit are reported within 10 working days of receipt of the request. Results are returned to the lab and requesting clinician.
8. Molecular tests at RMH have a TAT within 3 weeks of receipt. Some rapid tests are sent to Sarah Cannon to mitigate this. This area is rapidly expanding. Results are available to requestor and lab on portal.

For results on specimens referred for a second opinion, contact the Histopathology secretary

It may be necessary to send referral material to ‘Centres of Excellence’ with renowned experts in specialised fields, these are chosen in consultation with the Cancer networks and MDT users.Please see below for a list of all referral labs we use.

## Referral Laboratories used by PAH Cellular Pathology

The department has a local policy on managing referrals for expert opinion. In these instances, the department monitors cases sent out. After 10 working days of posting (or at the cancer teams request), the referral centre is contacted for a report update. After this period, the centre is contacted periodically until the report is returned.

|  |  |
| --- | --- |
| **Specialty** | **Referral Centre** |
| Alopecia | St John’s Institute of Dermatology |
| Amyloidosis | National Amyloidosis Centre, Royal Free Hospital |
| Anal malignancies | The Royal Free Hospital |
| Appendiceal (and other GI) neuroendocrine tumours | The Royal Free Hospital |
| Appendiceal mucinous neoplasm | Basingstoke Hospital |
| Bone and Soft Tissue Malignancy | Royal National Orthopaedic Hospital |
| Breast | Elena Provenzano (Addenbrookes)  If for the LORIS trial then send to Sarah Pinder |
| ENT (malignant) cases / oral cavity / oesophageal/stomach cancers | UCLH |
| GI (lower) | UCLH |
| GI (Upper) (Oesophageal and gastric biopsies) | UCLH |
| GISTs (all sites) | UCLH |
| Gynaecology (including uterine sarcomas) | UCLH |
| Gynaecology (exceptionally rare cases) | Professor McGluggage, Belfast |
| Hepatobiliary | The Royal Free Hospital |
| Lung lesions | Alex Rice (Brompton) |
| Spindle cell lung lesions | RNOH |
| Lymphomas | UCLH - SHIMDs |
| Ocular / Eyelid Pathology | Moorfield’s Eye Hospital |
| POCs and molar pregnancies | Charring Cross Hospital |
| Placenta and POCs | Great Ormond Street Hospital |
| Salivary glands | The Royal London Hospital |
| (Difficult) Skin lesions and melanocytic lesions | Addenbrooke’s Hospital |
| Thyroid / parathyroid lesions (including Thy 3a &Thy 3f; Thy4 & Thy5 Cytology). | The Royal Free Hospital |

## Non-Gynaecological Cytology

Cytology specimens normally consist of fresh, unfixed material e.g.: serious fluids, urine, breast & thyroid FNA fluid etc. For this reason they should be sent to the laboratory without delay. Degeneration and autolysis of cells starts immediately following collection and this will affect the result. Specimens taken at a time where they would not reach the laboratory by 4.30pm should be stored in the fridge and sent to the laboratory first thing the following morning. CSF specimens are an exception to this rule and must be processed without delay.

All specimens and/or slides must be clearly labelled and accompanied with an appropriate request form containing all the relevant data. Any slides that are prepared should be labelled in pencil with the patient’s name and date of birth and whether the slide is fixed “F” with alcohol [cytofixx spray] or air dried “AD”. “F” & “AD” slides should be placed in separate slide mailers.

High risk specimens must be clearly labelled. High risk specimens will require consultation with a senior member of the technical team.

Results will normally be available 48 hours after receipt in the laboratory. The results for urine cytology specimens will be available in 7 working days.

### Range of tests

**Body fluids**

Collect in a (50 or 100 ml but no larger) sterile container

**Bronchial brushings**

Place brush into a universal filled with Cytolyt solution

**Bronchial washings**

Collect into a provided 120ml of Cytolyt solution

**Cerebrospinal fluid**

Collect into 20ml sterile container(s)

**Fine needle aspiration**

The sample should be collected by an experienced aspirator

Prepare 2-4 smears, half of which should be air dried and the remainder fixed with 95% alcohol or spray fixed with cytofixx [Available on request from cellular pathology]

Air drying should be performed immediately by wafting smears in the air for 20 seconds

Alcohol fixation must be immediate and fully covers the slide

**Contact the laboratory for further information**

**FNA breast**

It is preferable to refer women with breast lumps to the breast clinic

FNA performed before mammography can disturb the radiological appearances

Cyst fluid aspirates send for cytological assessment only when the lump persists following aspiration or if it is blood stained

If the lump persists after the cyst has been aspirated then refer to the breast clinic

**Gastric brushings**

Place brush into a universal filled with Cytolyt solution

**Joint fluid**

Collect in 20ml universal container

**Nipple discharge**

Wipe the slide against the nipple surface and spread the discharge evenly

Dry in air immediately by wafting the slide for 20 seconds

**Oesophageal brushings**

Prepare 2 slides, and fix with 95% alcohol or cytofixx spray

**Skin scrapes**

The skin lesion should be scraped with a dissector

Spread the material evenly on a labelled slide

Fix by flooding the slide with 95% alcohol or use cytofixx spray

If you have no fixative, air dry the slide immediately

**Sputum**

Collect in 50ml sterile container(s)

The specimen should be a deep cough spit and not saliva

Specimens should be obtained prior to food or drink

**Urine**

Collect in a 150ml container

Ideally a mid-morning, whole sample should collected and sent to the laboratory as soon as possible (preferably within an hour of collection) to avoid degeneration of cells.

Multiple samples on consecutive days are not required unless requested by the pathologist.

Early morning and Mid-stream urine samples are for microbiological investigations and are unsuitable for cytology.

## Cervical Cytology

Cervical screening in this District is carried out every 3 years between the ages of 25 – 49 and 5 years for 50 - 64 years, unless clinically indicated. A Pan Essex cervical screening policy document should be available in all G.P practices. Copies may be requested from the laboratory.

LBC preparation (Thinprep Liquid Based Cytology) kits are available from the laboratory order [tpa-tr.cellpath@nhs.net](mailto:tpa-tr.cellpath@nhs.net)

The Cytology Screening service is contracted by NHSE to Norfolk and Norwich University Hospital. 01603287412

Cervical Screening Provider Lead ………………………… Dr Arif (01279 827352)

Results of routine smears will be available within 14 days of sample taking. Codes for individual smear takers (including practice nurses) are available from the contracted Provider Norfolk and Norwich University Hospital. Sample takers are required to undergo mandatory training for LBC before they can take samples, training is provided by Norfolk and Norwich University Hospital.

Direct referral for Colposcopy is in place; Norfolk and Norwich University Hospital will contact PAH for those patients requiring Colposcopy referral.

## Post Mortem

For general queries, please phone the Mortuary manager Mr Ken Connolly (01279 444455 Ext 7089)

All post mortems are performed in the mortuary, Princess Alexandra Hospital.

Please refer to standard instructions in patient’s office for advice on Death Certification and on cases which should be referred to H. M. Coroner. The pathologists are happy to advise Junior Medical Staff on Death Certification.

Post mortem services are available for patients referred by their general practitioner. GPs should phone one of the histopathologists.

Post mortem reports are routinely sent to medical secretaries for filing in the patient’s notes. Reports will be sent to GPs on request (except Coroners reports on suspicious deaths).

Clinical request must be accompanied by a request form giving clinical information and a consent form signed by the highest qualifying relationship. Forms are available from the patient’s affair office.

Post mortem demonstrations for junior medical staff and medical students are held from 0900 -12:00 every Tuesday.

Appropriate neonatal post mortems are referred to Addenbrookes Hospital (exception being Coroners Post Mortem’s were the coroner will decide location).

A proportion of the more straight forward cases are performed by a Duty Pathologist.

# Haematology

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**Haematology**

## Contact Information

**Consultant Haematologists:**

Dr F Al-Refaie 01279 978858

Dr Kameta Imaeva01279 827190

Dr Ali Shokoohi 01279 978906

Dr Farouk Rezk 01279 973524

Haematology Main Laboratory 01279 973214

Blood Transfusion Laboratory 01279 962266

Coagulation Laboratory 01279 978568

Anticoagulant (warfarin) clinic 01279 827031/ 01279 827599 (Warfarin enquiries)

01279 827599 (Health Care Professionals)

**Sample Tube:**

BD Blue Top (Citrate anticoagulant); Filled to full line using vacutainer system

BD Pink Top (EDTA anticoagulant); Filled to minimum 2ml minimum per test unless otherwise stated

BD Mauve Top (EDTA anticoagulant) Filled to minimum 2ml minimum per test unless otherwise stated

BD Red / Yellow Top (Clotted) Filled to minimum 2ml minimum per test unless otherwise stated

**Please do not bleed any referral tests on a Friday due to sample storage/transport. If urgent please contact the laboratory**

All tests sent to a referral lab are highlighted in yellow.

## Haematology tests (Inc. Blood Transfusion)

NOTE: The reference range document is available at annex 1

| **Test** | **Turnaround Time** | **Sample Type and Container** | **Reference Ranges/ Decision values** *(T= Therapeutic)* | **Referred** | **Notes (Inc. special precautions / affecting factors / patient preparation)** |
| --- | --- | --- | --- | --- | --- |
| **Antibody Identification** | 24 hours (7 - 10 days if sent for confirmation) | Blood / 2 x pink |  |  | **Limitations**: Incorrect labelling of tube / form will delay testing and subsequent blood issue. Some red cell antibodies may cause delay in providing compatible blood. Recent massive transfusions of a differing ABO / Rh may mask the patients ABO / Rh group. |
| **Anticardiolipin Antibodies** | 3 weeks | See Lupus anticoagulant | See individual reports | Health Services Laboratory  The Halo Building  1 Mabledon Place  London  WC1H 9AX | Top of Form  **Clinical Indications**: SLE Antiphospholipid syndrome (venous and arterial thrombosis, stroke, TIA and multiple-infarct dementia in the absence of other features of lupus), Thrombocytopenia  Recurrent foetal loss Please note: Transient antibodies may be found after viral infections. It is therefore important to send a repeat sample after 12 weeks to confirm a diagnosis of anti-phospholipid syndrome. The patient should also be tested for the presence of Lupus Anticoagulant (if the patient is not on anticoagulant treatment)Bottom of Form |
| **Antithrombin** | 3 weeks | See thrombophilia screen | See Annex 1 |  | See thrombophilia screen |
| **APCR** | 3 weeks | Blood:  1 x blue top  1 x mauve top | See Annex 1 |  | See thrombophilia screen |
| **APTT** | 4 hours | Blood:  1 x blue top | See Annex 1 |  | **Clinical Indications**: Activated Partial Thromboplastin Time (APTT) ordered as part of coagulation screen for an investigation of a possible bleeding disorder or thrombotic episode; to monitor unfractionated (standard) heparin anticoagulant therapy. Monitor haemostatic integrity **Collection criteria**: DO NOT use heparinised syringes / lines for collecting coagulation screens. Patient should be bled with minimal stasis, and samples received in lab within 2 hours of collection **Limitations:** anticoagulant contamination, activated sample, sample haemolysis or lipaemia |
| **APTT ratio** | 4 hours | Blood:  1 x blue top | See Annex 1 |  | See APTT |
| B**12 (vitamin)** | 24 hours | Serum:  1 x yellow top | Low < 170 pg/ml  Border 170 - 250 pg/ml  Elevated > 250 pg/ml |  | **Clinical Indications**: Investigation of suspected vitamin B12 deficiency. Follow-up of megaloblastic anaemia, macrocytosis or nutritional anaemias. Detection of vitamin B12 deficiency found in pernicious anaemia, folic acid deficiency. In other situations, low levels of vitamin B12 does not necessarily indicate significant clinical deficiency. **Limitations:** Samples should not be taken from patients receiving therapy with high Biotin doses (>5mg/day) until at least 8 hours following last biotin administration. |
| **Basophils** | See FBC | See FBC | See reference range document |  | See FBC |
| **BCR-ABL** | 7 - 14 calendar days | 10-20ml blood/mauve | See individual reports | UCLH SIHMDS  SIHMDS Flow Cytometry, Level 2 Halo HSL. The Halo Building.  1 Mabledon Place  London  WC1H 9AX  Tel: 02039081341 |  |
| **Blood Group** | 24 hours | Blood:  1 x pink top |  |  |  |
| **Blood group -  Ante-natal** | 24 hours | Blood:  1 x pink top | BCSH Guidelines for Blood Grouping and Antibody Testing During Pregnancy |  | **Clinical Indications:** Routine screening programme for antenatal patients |
| **Blood group - Crossmatch** | 24 hours  Turnaround on referred tests can be  7-10 days. If required urgently call the laboratory for advice. | Blood:  1 x Pink top |  |  | **Specific Criteria:** Relative to previous transfusion history, please call laboratory for advice**.** |
| **FISH** | 10 - 21 calendar days | 1-2ml bone marrow | See individual reports | UCLH SIHMDS, SIHMDS Flow Cytometry, Level 2 Halo HSL. The Halo Building, 1 Mabledon Place. London. WC1H 9AX  Tel :02039081341 | **Bone marrow by arrangement with consultant haematologist only** |
| **Cytogenetics** | Up to 21 calendar days | 1-2ml bone marrow or blood / mauve top | See individual reports | UCLH SIHMDS, SIHMDS Flow Cytometry, Level 2 Halo HSL. The Halo Building, 1 Mabledon Place.  London. WC1H 9AX  Tel :02039081341 | **Bone marrow by arrangement with consultant haematologist only** |
| C**oagulation Inhibitor Screen** As required by special arrangement | 5 days | Blood:  3 x blue top | Qualitative See individual test reports | Haemostasis and Thrombosis Dept.  St Thomas’ Hospital  North Wing 4th and 5th Floors  Westminster Bridge Road, LONDON, SE1 7EH,  Tel: 020 718 82797 | **Clinical Indications:** Used to establish the presence of immediate acting or time-dependent clotting factor specific inhibitor.  **Patient Preparation:** DO NOT use heparinised syringes / lines for collecting coagulation screens. Patient should be bled with minimal stasis, and samples received in lab within 2 hours of collection |
| **Coagulation Screen (PT/APTT)** | 4 hours | Blood:  1 x blue  top | See Annex 1 |  | **Indication:** A group of tests used to assess bleeding risk and / or monitor bleeding conditions **Specific Criteria**: DO NOT use heparinised syringes / lines for collecting coagulation screens. Patient should be bled with minimal stasis.  **Refer to appendix 3 under notes** |
| **Cold Agglutinins** | 24 hours | Blood:  1 x red top | Positive results may be indicative of Cold Haemaglutinin Disease which would normally be accompanied by a positive Direct Antiglobulin Test showing C3 on the patient’s cells. | Please refer to Blood Transfusion. | **Specific Collecting Conditions:**  **Limitations:** This test is not suitable as a surrogate test for Mycoplasma Pneumonia, Atypical Pneumonia, or Syphilis.  Samples that are not kept at the required temperature will give possible incorrect results, please contact Blood Transfusion for sample collection. A fourfold or greater rise in the titre of cold agglutinins is suggestive of a recent *M. pneumoniae* infection. |
| **Cord Blood Group** | 24 hours | Blood:  1 x pink top |  |  |  |
| **Crossmatch** | 24 hours  Turnaround on referred tests can be 7-10 days. If required urgently call the laboratory for advice. | Blood:  1 x pink top |  |  | Specific Criteria: Relative to previous transfusion history, please call laboratory for advice. |
| **Direct Coombs Test** | 24 hours | Blood:  1x Mauve/pink top or 1 ml if neonatal patient | See Annex 1 |  | **Limitations:** False-positive or false-negative test results can occur from bacterial or chemical contamination of test materials, improper centrifugation or improper storage of materials. Anomalous results may be caused by fresh serum or fibrin or particulate matter in plasma. Not all positive reactions imply the presence of clinically significant antibodies. To further investigate positive results elution techniques may be used. |
| E**osinophils** | See FBC | Blood:  1x mauve top | See Annex 1 |  | See FBC |
| D **Dimers** | 4 hours | Blood:  1 x blue top | Below 500 ng/mL FEU. for exclusion of VTE |  | **Clinical Indications**: To aid in exclusion of VTE in association with a pre-test clinical score. To aid in the investigation of DIC |
| **ESR** | 24 hours | Blood:  1 x mauve top  3 ml minimum volume  Not available for paediatric containers | See Annex 1 |  | Acute phase response: Increase is slow & takes 4 -6 days to subside after resolution of acute disease. ESR is helpful in the diagnosis and monitoring of two specific inflammatory diseases: temporal arteritis and polymyalgia rheumatica |
| F**actor II** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results Please note Factor II assay is NOT the same as Factor II Leiden assay  **Limitations**: Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor IX** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications**: Excessive bleeding, especially haemarthroses. Severe unexplained or excessive bruising **Limitations**: Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor V** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results. Please note Factor V assay is NOT the same as Factor V Leiden assay **Limitations:** Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor VII** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results **Limitations:** Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor VIII** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Excessive bleeding, especially haemarthrosis. Severe un-explained or excessive bruising. The deficiency is very rare in female patients **Limitations:** Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor X** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results **Limitations**: Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor XI** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results **Limitations**: Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor XII** | As required | Blood:  2 x blue top | See Annex 1 |  | **Clinical indications:** Unexplained bruising/bleeding, prolonged routine clotting results **Limitations**: Anticoagulation, poor phlebotomy practice (activated clotting pathway) |
| **Factor XIII** | 10 calendar days | Blood:  2 x blue top | See Annex 1 | Haemostasis and Thrombosis Dept.  St Thomas’ Hospital  North Wing 4th and 5th Floors  Westminster Bridge Road, LONDON, SE1 7EH,  Tel: 020 718 82797 | **Clinical Indication:** Re-bleeding from umbilical stump. Poor clot formation leading to re-bleeding from “healed” trauma sites. Spontaneous abortion |
| **Factor V & II Leiden** | 14 days | Blood:  2 x blue top and 1 x mauve top | See individual reports | Haematology Department  North Middlesex Hospital Trust  Sterling Way, Edmonton, London, N18 1QX, Tel: 0208887 2000 ext: 2436 |  |
| **Fibrinogen** | As required | Blood:  1 x blue top | See Annex 1 |  | **Indication**: Used to assess bleeding risk and / or monitor bleeding conditions **Specific Criteria**: Patient should be bled with minimal stasis. |
| **Full Blood Count (FBC)** | 24 hours  In patients: 4hours | Blood:  1 x mauve top or paediatric Pink | See Annex 1 |  | **Clinical Indications:** Integral part of most diagnostic investigation |
| G**6PD** | 3 working days | Blood:  1 x Mauve top | See Annex 1 | Level 2 Special Haematology  Health Services Laboratories  The Halo Building, 1 Mabledon Place, London, WC1H 9AX | **Clinical Indications**: Some cases of neonatal jaundice and anaemia. Occasional cases of anaemia. Haemolysis when patient exposed to oxidant compounds **Limitations:** White blood cells, platelets and reticulocytes may be rich in G6PDH and may, if present at increased levels give a false normal result. |
| Haematocrit  (Hct or PCV) | See FBC | See FBC | See Annex 1 |  | See FBC |
|  |  |  |  |  |  |
| **Haemoglobin-opathy screen** | 3 working days | Blood:  1 x Mauve top | See Annex 1 |  | **Clinical Indications**: To confirm or exclude presence of variant haemoglobins and or beta thalassaemia. Part of national screening programme of all antenatal patients for early detection of haemoglobin abnormalities including sickle cell and thalassaemia conditions **Limitations:**  Recent transfusion may mask / reduce level of any variants present.  Any genetic predictions following these results assume that the family relationships are as stated and on the Family Origin Questionnaire (FOQ) and the sample identification is correct.  **Situations requiring particular care in the interpretation of Results**   1. Fertility treatment- donor gametes. 2. Adoption 3. Bone Marrow Transplant 4. Gene therapy   Please note the HbS% is unreliable if patient has been on Voxelator treatment. Please contact the haematology laboratory for further guidance |
| **Confirmation of abnormal Haemoglobin variant (excluding HbS)** | 8 - 10 working days | Blood:  1 x Mauve top | See Annex 1 | Barts Health laboratory  Red Cell Laboratory  c/o Specimen Reception, 4th Floor  Pathology and Pharmacy Building  80 Newark Street, Whitechapel  London E1 2ES  Tel: 0203 2460342 | Clinical Indications: To confirm or exclude presence of variant haemoglobins and or beta thalassaemia. Part of national screening programme of all antenatal patients for early detection of haemoglobin abnormalities including sickle cell and thalassaemia conditions  Limitations: Recent transfusion may mask / reduce level of any variants present |
| **Haemoglobino-pathy Screen for babies < 1 month** | 5 working days | Blood:  1 x mauve top | See Annex 1 | Central Middlesex, Acton Lane  Park Royal London, Central Middlesex Hospital  Level 2 Becad, Haematology Department  NW10 7NS  Tel 202 8453 2671 |  |
| **Genotyping of Haemoglobin disorders** | Prenatal diagnosis:  3 days  Antenatal:  21 days  Complex: 96d | Blood:  1 x mauve top | See Annex 1 | Molecular Haematology, Level 4  John Radcliffe Hospital, Oxford. OX3 9DU  Tel: 01865 572769 |  |
| **Haemoglobin** | 24 hours | See FBC | See Annex 1 |  | See FBC |
| **Haemoglobin A2** | 3 working days | See Hb’opathy screen | 2.2 - 3.2 % |  | See Haemoglobinopathy screen |
| **Haemoglobin F** | 3 working days | See Hb’opathy screen | 0.0- 0.5 % |  | See Haemoglobinopathy screen |
| **Haemoglobin S** | 3 working days | See Hb’opathy screen | See individual reports |  | See Haemoglobinopathy screen |
| I**mmuno-phenotyping**  **(Flow Cytometry)** | 2 working days | Blood:  1 x mauve top | See individual reports | UCLH SIHMDS  SIHMDS Flow Cytometry,  Level 2 Halo HSL, The Halo Building, 1 Mabledon Place. London. WC1H 9AX  Tel :02039081341 |  |
| **INR** | 4 hours | Blood:  1 x blue top | See Annex 1 |  | **Clinical indications:** International Normalised Ratio (INR) ordered as part of coagulation screen or separately to help diagnose unexplained bleeding or for monitoring of oral anticoagulant therapy.  **Limitations:**  Activated sample, sample haemolysis or lipaemia. |
| J**AK2 V617F mutation** | 14 calendar days | Peripheral blood or Bone Marrow Aspirate in EDTA |  | UCLH SIHMDS  SIHMDS Flow Cytometry,  Level 2 Halo HSL, The Halo Building, 1 Mabledon Place. London. WC1H 9AX  Tel :02039081341 | **Limitations**: Presence of heparin anticoagulant will inhibit assay |
| K**leihauer (Maternal)** | 24 hours | Blood / 1 x Mauve  top | < 4 cells / lpf  (>2ml/lpf referred to NHSBT to assess requirement for further prophylactic anti-D dose.) | NHSBT- See blood transfusion | **Clinical Indications**: To determine the presence of foetal cells in maternal circulation. May also be used in cases of abdominal trauma during pregnancy, when a foetal bleed may be suspected.  **Limitations:** False negatives due to lack of full circulation of foetal cells in the mother (Cord samples must be collected immediately post-partum and mother's samples should be collected a minimum of 1 hour post-delivery to allow full circulation of any foetal blood) |
| L**upus anticoagulant** | 3 weeks | Blood:  2 x blue  and  1 x red top | See individual reports |  | **Clinical Indications**: Second Trimester spontaneous abortion / unexplained /recurrent DVT or CVA / Thrombocytopenia with thrombotic complications  **Limitations:** Acute Phase response, on Oral Anticoagulation |
| **Lymphocytes** | See FBC | See FBC | See Annex 1 |  | See FBC |
| M**alarial Parasites** | Se FBC | Blood:  1 x mauve  top | Qualitative | All positive samples sent for confirmation to  Malaria Reference laboratory (for confirmation of positive screens), Faculty of Infectious and Tropical Disease, London W1T 4EU Keppel Street, WC1E 7HT | **Limitations**: Current Malarial Antigen assay does not detect antigen for Plasmodium Knowlesi |
| **MCH** | See FBC | See FBC | See Annex 1 |  | See FBC |
| **MCV** | See FBC | See FBC | See Annex 1 |  | See FBC |
| **Monocytes** | See FBC | See FBC | See Annex 1 |  | See FBCBottom of Form |
| N**eutrophils** | See FBC | See FBC | See Annex 1 |  | See FBC |
| P**arasites** | See FBC | Blood:  1 x mauve top | Qualitative |  |  |
| **Paul Bunnell** | 24 hours | Blood:  1 x mauve top | Qualitative |  | The Infectious mononucleosis (IM) heterophile antibody has been associated with disease states other than IM, in primary infections of adults with clinically atypical diseases, EBV-specific laboratory diagnosis may be helpful.  Some segments of the population who contract IM do not produce measurable levels of heterophile antibody.  Some individuals are reported to maintain a low but persistent level of heterophile antibodies after their primary illness. Heterophile antibodies have been detected in blood samples taken more than a year after the onset of the illness.  EBV-specific laboratory diagnosis may be helpful in the above scenarios |
| **Platelets** | See FBC | See FBC | See Annex 1 |  | See FBC |
| **Protein C** | 3 weeks | See thrombophilia screen | See Annex 1 |  | See thrombophilia screen |
| **Protein S** | 3 weeks | See thrombophilia screen | See Annex 1 |  | See thrombophilia screen |
| **Prothrombin Time** | 4 hours | Blood:  1 x blue top | See Annex 1 |  | **Clinical indications**: Prothrombin Time ordered as part of coagulation screen or separately to help diagnose unexplained bleeding or for monitoring of oral anticoagulant therapy.  **Limitations**: Activated sample, sample haemolysis or lipaemia. |
| R**BC (Red Blood Count)** | See FBC | See FBC | See Annex 1 |  | See FBC |
| **Reticulocytes** | See FBC | Blood:  1 x mauve top | See Annex 1 |  |  |
| T**hrombophilia screen** | 3 weeks | Blood:  3 x blue top  and 1 x red top | See individual report for interpretation and reference range. For guidance contact consultant haematologist. |  | Samples should be taken with minimal stasis Patient should ideally be at rest and not in acute phase reaction. Limitations: Lipaemia and icteric samples, acute phase response, on oral anticoagulation |
| S**ickle Cell Screen** | 24 hours  If urgent contact Haematology laboratory | Blood:  1 x mauve top | Qualitative |  | **Clinical Indications:** To confirm or exclude presence of Haemoglobin S as a confirmation test as part of the haemoglobinopathy screen or in cases of urgent clinical need prior to emergency surgery. **Limitations:** This test is unreliable: i) In infants less than 3 months old.  ii) In the presence of Dextrans.  iii) In the presence of abnormal levels of serum protein.  Please note the Limit of detection for this assay is HbS of 20%. |
| **Thrombin Time** | 3 weeks | See thrombophilia screen | See Annex 1 |  | See thrombophilia screen |
| **Von Willebrand Screening** | 3 weeks | Blood:  2 x blue top | See Annex 1 |  | Please note patient ABO blood group is important for interpretation of results**.** |
| W**BC (White Blood Count)** | See FBC | See FBC | See Annex 1 |  | See FBC |

Measurement Uncertainty values for applicable tests is available on request from the Haematology Department.

## Anticoagulation Services

There are currently two sections; Anticoagulation Monitoring Service (AMS) and the Anticoagulation nurses.

**Anticoagulation Monitoring Service**

The AMS is a multidisciplinary team comprising biomedical scientists, pharmacists, nurses and support staff. They provide a patient-centred community-based service and are currently based in Galen House. They responsible for the monitoring and dosing of patients on VKA anticoagulants. Most patients are tested by point of care and these appointments are made by the clinic each time. Some patients still require or choose to have venous samples taken for INR and these appointments will need to be booked on Swiftcue by the patient each time. These appointments should be booked in the morning to allow turnaround of dosage advise on the same day. Abnormal results requiring further investigation or action such as stopping treatment for more than one day will be telephoned to the patient ASAP. The service also supports self-testing for appropriate patients following training and regular validation.

We have a team of Anticoagulant Nurses who are responsible for ensuring all patients on anticoagulants are given an out-patient appointment within two weeks of starting therapy in order to receive sufficient counselling and education about their anticoagulant treatment.

**Anticoagulants are one of the classes of medicines most frequently identified as causing preventable harm and admission to hospital and therefore it is essential that guidelines and protocols are always followed.**

Accurate and detailed documentation is required and the team is available to support in giving appropriate advice.

**Inpatients**

For all inpatients starting on anticoagulants you **must:**

* Understand any bleeding risks, consider any concurrent medication, be aware of interactions and contraindications.
* Complete prescription on Alex Healthand ensure INRs are monitored appropriately

**On discharge**:

* Send a referral to the AMS for all patients discharged on warfarin or other VKA, this includes those admitted on warfarin. Patients newly started on DOAC’s require a referral to anticoagulation nurses for follow up education appointment. Alex Health referrals should be sent through to AMS.
* Counsel all patients new to anticoagulants before discharge so they understand the risks.
* Ensure patients are discharged with written documentation of their dose and date of next INR and that the INR test has been booked. Provide yellow book and alert card for patients on warfarin/ sinthrome.
* Ensure the patient has adequate supply of anticoagulants. On going supply will be by GP so details must be included in the discharge summary
* **Fill in the yellow Oral Anticoagulant Therapy booklet** ensuring the following details are provided:
* Patients full name, DOB, Hospital No., address, including postcode and phone number
* Condition requiring anticoagulation and duration of treatment required
* Referring clinician
* Patient’s dosing history, including loading doses and the dose of anticoagulant on discharge.
* The last INR result prior to discharge.
* **Ensure patient knows where and when to go for their first blood test**

Please contact the AMS to book a finger prick appointment. Anticoagulant patients may also attend for a blood test on the morning of the date given. Phlebotomy clinics are at PAH, St. Margaret’s (Epping) and Herts. and Essex (Bishop’s Stortford). Many Patients can also obtain a blood test at their GP Surgery- please check with surgery to see if this service is available.

**Anticoagulation nurse clinics:**

The specialist anticoagulation nurses receive referrals for patients discharged on anticoagulants. These patients will receive an education appointment within 2-3 weeks of discharge. They also receive referrals from GP’s to initiate, review or switch anticoagulants**.** Once referred, patients will be seen in clinic where their treatment will be initiated according to national guidelines. They will be fully counselled and monitored according to these guidelines.

# Blood Transfusion

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**Blood Transfusion**

## In patients

Requests for Blood for transfusion must be made by registered clinicians only.

## Request forms and samples for grouping

Forms must be completed in full and specimens must be handwritten; **addressograph / pre-printed labels on samples will not be accepted**

Request forms and samples must have all information fields completed to ensure safe provision of blood products:

* Full Name of the Patient
* Hospital/NHS Number
* Date of Birth
* Procedure
* Transfusion indication
* Special Requirements
* Pregnancy status
* Location
* Dr’s name & Alertive role or ext no.
* Name of sample taker

The department operates a **Zero Tolerance** of mislabelled request forms and samples. The request form and sample **must be signed by the person collecting the blood sample; the form must also be signed by the doctor making the request.**

**Sample details that have been amended (names scribbled out etc.) or illegible, will not be accepted.**

**Blood Training** is a statutory and mandatory requirement for all staff involved in the blood transfusion process and managed by the core competencies for venepuncture and blood requesting are available from blood link trainers.

Any patient requiring a transfusion of red blood cells must have a historical blood group. If this is not available the laboratory will inform you with any requirements.

Trust Blood Transfusion Policy can be found on the Trust Intranet Site (ALEX) and staff are encourage to utilise the NHSBT Blood Components app which can be download on a device such a phone or tablet, which contains clinical information to support safe Transfusion practise.

## Sample referral

Referral of Samples from Blood Transfusion are to NHS Blood and Transplant Centres which are UKAS accredited and licenced by the Medicines and Healthcare products Regulatory Agency (MHRA)

|  |  |  |
| --- | --- | --- |
| **Laboratory** | **Tests referred** | **Approval status** |
| RCI Filton  North Bristol Park, Northway, Filton, Bristol, BS34 7QH  RCI Colindale  Colindale Avenue, London, NW9 5BG | Atypical antibodies  Haemolytic transfusion reactions (HTR)  ABO/D grouping, including problems Direct Antiglobulin Test (DAT)  Auto-immune haemolytic anaemia (AIHA)  Provision of crossmatched units in difficult cases  Investigation of IgA deficiency  Antenatal reference service  Measurement of maternal antibody levels during pregnancy (quantification and titration)  Paternal Phenotype  Foetal genotype  Determination of feto-maternal haemorrhage | Approved |
| H&I Filton  North Bristol Park, Northway, Filton, Bristol, BS34 7QH  H&I Colindale  Colindale Avenue, London, NW9 5BG | Investigation of:  Platelet refractoriness (HLA antibody screen)  Transfusion-Related Acute Lung Injury (TRALI)  Transfusion-Associated Graft Versus Host Disease (TA-GVHD)  Neonatal AlloImmune Neutropenia (NAIN)  Autoimmune neutropenia  Drug related neutropenia  Platelet Immunology  Foetal/Neonatal AlloImmune Thrombocytopenia (NAIT)  Heparin Induced Thrombocytopenia (HIT)  Other drug related thrombocytopenias  Autoimmune thrombocytopenia  Post Transfusion Purpura (PTP)  Platelet glycoprotein estimation for  thrombasthenia investigation  HLA specific antibodies | Approved |
| Molecular Diagnostics  International Blood Group Reference Laboratory  (IBGRL)  NHS Blood and Transplant  North Bristol Park  Filton  Bristol BS34 7QH  UK | Non-invasive fetal genotyping from maternal blood | Approved |

# Chemical Pathology

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## Contact Information

For 8x8 telephoning, dial the last four digits of the phone number.

**Consultant** Dr R Saldana 01279 97 **3386**

**Consultant Clinical Scientist** M. Parsons 01279 97 **3040**

**Head Biomedical Scientist** A. Adewuyi 01279 97 **3040**

**Main Laboratory** 01279 97 **3404**

**Manual Laboratory** 01279 97 **3376**

**Secretary** Theresa01279 97 **8812**

**Results Coordinator** K. Goff01279 97 **3272**

## Tests with special requirements

|  |  |
| --- | --- |
| **Test** | **Special sample requirements** |
| ACTH | EDTA sample (mauve top) brought to the lab immediately |
| Aldosterone | Li Heparin (green top) sample brought to the lab immediately |
| Amino Acid (Blood) | Li Heparin (green top) sample brought to the lab immediately |
| Amino Acid (Urine) | Fresh urine must be brought to the lab immediately. |
| Ammonia | EDTA sample (mauve top) must be collected from the lab and sample brought to the lab on ice |
| Calcitonin | Yellow or red top vacutainer brought to lab immediately on ice. |
| Carotene | Red top vacutainer protected from light and brought to the lab immediately. |
| Chromium | Blue top vacutainer brought to the lab immediately. |
| Copper | Blue top (Yellow top acceptable) vacutainer brought to the lab immediately. |
| C-Peptide | Yellow top vacutainer brought to the lab immediately. |
| Cryoglobulin | Contact the laboratory on extension 2646 prior to phlebotomy. |
| CSF-Xanthochromia | Minimum 1 ml (20 drops) from 4th tap in white top universal tube. Protect from light and bring to the lab immediately. |
| C1-Esterase Inhibitor | Yellow top vacutainer brought to the lab immediately. Should be bled in the morning Monday to Thursday. |
| Gut hormones | EDTA sample (mauve top) brought to the lab immediately. |
| Homocysteine | Lithium heparin (green top) sample brought to the lab immediately |
| IGF-1 | Yellow top vacutainer brought to the lab immediately. |
| Insulin | Yellow top vacutainer brought to the lab immediately |
| Porphyrins | EDTA blood (mauve top), early morning urine and faeces sample should be protected from light and brought to the lab immediately. |
| Reducing Substances | Fresh urine or faecal sample brought to the lab immediately. |
| Renin | Li Heparin (green top) sample brought to the lab immediately |
| Selenium | Blue top vacutainer brought to the lab immediately. |
| Very long chain fatty acids | EDTA or lithium heparin sample brought to the lab immediately |
| VMA (children only) | Spot urine brought to the lab immediately. |
| Vits A and E | Yellow top vacutainer protected from light brought to the lab immediately |
| Zinc | Blue top vacutainer brought to the lab immediately. |

**Chemical Pathology Test Repertoire**

Availability, sample type, collection bottle, adult normal range and units, age related reference ranges and details of referral laboratory if appropriate.

**Non-standard abbreviations:**

|  |  |  |
| --- | --- | --- |
| SA | = | Sent Away to reference laboratory. |
| SR | = | Special requirements. Please refer to table above. |

**Please Note: Send Away Tests (marked SA) will need an extra sample tube**

**Container types**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Blood** | BY | Yellow top. Plain bottle (contains separating gel) |  | **Urine** | U1 | 24 hour container with acid (preservative) |
| BG | Grey top. Contains Na Fluoride preservative. |  | U2 | 24 hour plain container. |
| BV | Green top. Contains Heparin anticoagulant. |  | U3 | Universal container (white top). |
| BB | Blue top. Na Heparin (Trace metal tube). Obtainable from the Biochemistry- Lab for special tests. |  | **CSF** | BG | Grey top. Contains Na Fluoride preservative  (Same as blood bottle). |
| BE | Mauve top. Contains Na EDTA anticoagulant. |  | U3 | Universal container. White top (Same as Urine). |
| BR | Red top. Plain bottle ; no gel |  | **Fluids** | BG | Grey top. Contains Na Fluoride preservative (Same as blood bottle). |
| HS | Heparinised syringe for blood gases only.  Not supplied by the Laboratory. |  | U3 | Universal container. White top (Same as Urine). |
| **Stool** | S1 | Universal container. Blue top. |  |  |  |  |

**N.B**. The Department reserves the right to discard specimens as unsuitable if they are received in inappropriate containers or in an unsafe condition. All tests available to request are listed below. Please note, tests highlighted in yellow are sent away to referral laboratories. Referral laboratories used are listed within the test information.

## Chemical Pathology test repertoire

| **Test name** | **Container type** | **Minimum sample volume** | **Turnaround Time** | **Adult range and units** Refer to individual report for age related ref range | **Send away laboratory** | **Notes** (Including special precautions/ affecting factors/patient preparation) |
| --- | --- | --- | --- | --- | --- | --- |
| **Angiotensin converting enzyme (ACE)** | BY | 0.5ml | 10 days | >14 years 8 – 52 IU/L  *Please note children have higher ACE activities (~1.4 X higher than adults, Beneteau-Burnat et al (1990). Clinical Chem 36: 344 – 346.* | ViaPath, Dept of Clinical Biochemistry  King’s College Hospital  Denmark Hill  London SE5 9RS  Blood sciences central reception:  0203 299 3576  GI section: 0203 299 4133  Trace Elements: 0203 299 4127 / 4337 / 2265  Duty doctor: 020 3299 3856 | When monitoring sarcoidosis, ACE inhibitors should be stopped for 12 hours prior to collection |
| **Acetyl choline receptor Antibodies** | BY | 1ml | 15 days | 0 - 0.44 nmol/L. | Immunology Dept, HSL Laboratories  The Halo Building, 1 Mabledon Place  London WC1H 9AX  02073079432 | No specific patient preparation |
| **Adrenocorticotropic hormone (ACTH) (09:00hrs)** | BE  SR | 1ml | 15 days | 0-50ng/L | Endocrine Bench  4th Floor Clinical Biochemistry  Pathology & Pharmacy  80 Newark Street, Royal London Hospital, Whitechapel London E1 2ES  Tel: 020 3246 0385 | Samples should be taken between 09.00 and 10.00 hrs and brought to the laboratory immediately. There should be a concurrent cortisol to allow interpretation of the ACTH result. |
| **AFP** | BY | 0.25ml | 24 hours | 0 – 12U/mL | N/A | No specific patient preparation. |
| **Albumin** | BY | 0.25ml | 24 hours | 35 –50g/L | N/A | Stasis during venepuncture will falsely elevate results. Ideally, blood should be drawn from a vein in which the blood is free flowing (that is, without a tourniquet). |
| **Aldosterone (random)** | B3 | 1.25ml | 10 days | Aldosterone (pmol/L): Upright 100 - 800, Supine 100 - 450  Aldo/Renin ratio: <80: Conn’s unlikely. >/=200: Conn’s likely. 80-200: Conn’s not excluded | ViaPath, Dept of Clinical Biochemistry  King’s College Hospital  Denmark Hill  London SE5 9RS  Blood sciences central reception:  0203 299 3576  GI section: 0203 299 4133  Trace Elements: 0203 299 4127 / 4337 / 2265  Duty doctor: 020 3299 3856 | B-blockers, ACEi/A2RB, CCB and diuretics should be stopped for 2 weeks prior to sampling. Spironolactone should be stopped for 6 weeks. An alpha blocker such as doxazosin may be substituted. Severe hypokalaemia (plasma potassium less than 2.9mmol/L) should be corrected prior to sampling. Potassium supplements, if given, should be stopped 24 hours prior to sampling. The patient should rest for 15 minutes prior to sampling and be in a sitting position. Samples should be taken to the laboratory immediately. |
| **Alkaline phosphatase** | SR  BY | 0.5ml | 24 hours | 0 – 14days: 90-273 IU/L  15days -1y: 134 –518 IU/L  1-3y: 156-369 IU/L  3-5y: 144-327 IU/L  6 -10y: 153-367 IU/L  Male 11-15y: 113-438 IU/L  Male 16-21y: 56-167 IU/L  Male 22 -79y: 50-116 IU/L  Female 11-15y: 64-359 IU/L  Female 16-29y: 44-107 IU/L  Female 30-79y: 46-122 IU/L | N/A | If there is an isolated raised alkaline phosphatase in a liver profile, suggest repeat on a fasting sample and request GGT. |
| **Alpha-1-antitrypsin** | BY | 0.25ml | 24 hours | 1.1 - 2.1g/L \* | N/A | In acute infection alpha-1-antitrypsin can be raised |
| **Alanine transaminase (ALT)** | BY | 0.25ml | 24 hours | Female <34 IU/L  Male <45 IU/L | N/A | No specific patient preparation |
| **Amino acids (blood)** | BV | 1ml | 20 days | See report | Chemical Pathology  Camellia Botnar Laboratories  Great Ormond St Hospital for Children  Great Ormond St  London WC1N 3JH  Tel: 020 7405 9200 Ext 5009 | Plasma amino acids fluctuate widely depending on the protein intake and whether the patient is in a fed or fasted state. Dietary restrictions may cause characteristic amino acid patterns to disappear and result in false negative results.  Collect sample during acute illness if possible, state feeding and advise if protein has been withdrawn. If non-acute situation, a fasting sample is preferred (2-3 hrs post feed in infants) |
| **Amino acids (urine)** | U3  SR | 1ml | 40 days | See report | Chemical Pathology, Camellia Botnar Laboratories, Great Ormond St Hospital for Children, Great Ormond St, London WC1N 3JH  Tel: 020 7405 9200 x 5009 | Collect sample as close to acute event as possible. If non-acute situation, a morning sample is preferred. Avoid faecal or bacterial contamination; sample to the laboratory immediately. |
| **Aminophylline (Theophylline)** | BY | 0.25ml | 24 hours | 10 – 20 mg/L | N/A | The blood samples MUST be taken at the correct time relative to the dose of drug. Slow release preparations 8hrs post dose others before next dose. IV infusion at 6 & 18 hours |
| **Ammonia** | BE  SR | 0.5ml | 6 hours | 18 - 72mmol/L | N/A | A sample tube must be collected from the lab and sample brought to the lab on ice.  The most common cause of a raised ammonia is artefactual due either to poor sample collection or a delay in transport to the laboratory. Haemolysis is an important cause of raised ammonia |
| **Amphetamine** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology  Homerton Hospital, Homerton Row, London, E9 6SR  Tel: 0208 510 7889/7887/7888 | Measured as part of urine drugs of abuse screen. |
| **Amylase** | BY | 0.25ml | 24 hours | 28 - 100 U/L | N/A | No specific patient preparation. |
| **Androstenedione** | BY | 4ml | 10 days | 3.0 - 8.0 nmol/L\* | Endocrine Bench, 4th Floor Clinical Biochemistry, Pathology & Pharmacy, 80 Newark Street  Royal London Hospital, Whitechapel London E1 2ES, Tel: 020 3246 0385 | This may not be analysed if testosterone is within the reference range. |
| **AST** | BY | 0.25ml | 24 hours | 5 -34 IU/L | N/A | No specific patient preparation.  Please note AST is not part of the routine liver (LFT) profile. |
| **Barbiturate** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology  Homerton University Hospital, Homerton Row, London, E9 6SR  Tel:0208 510 7889 /7887/ 7888 | Measured as part of urine drugs of abuse screen. |
| **Bence-Jones protein** | U3  EMU | 20ml | 7 days | NIL | N/A | An early morning urine is required |
| **Beta HCG (pregnancy)** | BY | 0.25ml | 24 hours | 0 - 4 U/L | N/A | For diagnosis of pregnancy, qualitative urine testing should routinely be used. Serum HCG should only be requested if ectopic pregnancy or miscarriage is suspected. |
| **Beta HCG (tumour)** | BY | 1ml | 8 days | 0 - 4 U/L | The SAS Laboratories Clinical Biochemistry and Medical Oncology  Charing Cross Hospital  London, W6 8RF  Tel: 0203 3311 1468 | No specific patient preparation |
| **Beta-2 microglobulin** | BY | 0.25ml | 24 hours | 0.97 - 2.64 mg/L | N/A | No specific patient preparation |
| **Bile acids** | BY | 0.25ml | 24 hours | 0-14 mmol/L | N/A | No specific patient preparation |
| **Bicarbonate** | BY | 0.25ml | 24 hours | 22 - 29 mmol/L | N/A | Please send a separate sample if possible |
| **Bilirubin (direct)** | BY | 0.25ml | 24 hours | 0 – 9 mmol/L | N/A | No specific patient preparation |
| **Bilirubin (total)** | BY | 0.25ml | 24 hours | 0 – 21 mmol/L  (During normal pregnancy bilirubin is 20% lower)\* | N/A | No specific patient preparation.  If a patient is found to have a raised total bilirubin, the laboratory will automatically reflex a conjugated bilirubin. |
| **BNP (NT-proBNP)** | BY | 0.5ml | 24 hours | <400ng/ml | N/A |  |
| **C1 Esterase inhibitor** | BY  SR | 3ml | 19 | 150-350 mg/L | Barts Health  4th Floor Clinical Biochemistry  Pathology & Pharmacy, 80 Newark Street, Royal London Hospital, Whitechapel London E1 2ES,  Tel: 020 3246 0385 | Should be bled in the morning Monday to Thursday and sample brought to the lab immediately. |
| **C1 Esterase inhibitor (functional)** | BY  SR | 3ml | 19 | 84 – 130% | As above | As above |
| **C3 (Complement)** | BY | 0.25ml | 24 hours | Female: 0.83 - 1.93g/L  Male: 0.82 - 1.85g/L | N/A | No specific patient preparation. |
| **C4 (Complement)** | BY | 0.25ml | 24 hours | Female: 0.15 – 0.57g/L  Male: 0.15 – 0.53g/L | N/A | No specific patient preparation. |
| **CA-125** | BY | 0.5ml | 24 hours | 0- 35 U/mL | N/A | No specific patient preparation.  CA-125 is a marker of ovarian cancer but can also be raised in other benign conditions eg pregnancy, menstruation, endometriosis. |
| **CA-153** | BY | 0.5ml | 24 hours | 0- 28 U/mL | N/A | No specific patient preparation.  Only available for requests from specialist secondary care. |
| **CA-199** | BY | 1ml | 6 | 0-35U/mL | Clinical Biochemistry Dept. Broomfield Hospital, Chelmsford, Essex, CM1 7ET, Tel: 01245 514159 or 514135 | No specific patient preparation.  Only available for requests from specialist secondary care. |
| **Calcitonin** | BP | 2ml | 20 | Female: < 5.5ng/L | The SAS Laboratories Clinical Biochemistry and Medical Oncology, Charing Cross, Hospital, London W6 8RF  Tel: 0203 3311 1468 | Collect sample after overnight fast. The sample should be brought to the laboratory immediately on ice. |
| **Calcium (24h urine)** | UI | N/A | 24 hours | 2.5-7.5mmol/24hr | N/A |  |
| **Calcium creatinine clearance ratio** | U3 and BY | 0.25ml BY  2ml U3 | 24 hours | Ca/Creatinine clearance ratio < 0.01 is suggestive of Familial Benign Hypocalciuric Hypercalcaemia | N/A | Random urine and concurrent blood sample required. |
| **Calcium** | BY | 0.25ml | 24 hours | 2.2 – 2.6 mmol/L | N/A | Stasis during venepuncture will falsely elevate results. Ideally, blood should ideally be drawn from a vein in which the blood is free flowing (that is, without a tourniquet).  Samples for further investigation of mild hypercalcaemia should be taken fasting. |
| **Calculus** | U3 | N/A | 8 days | See report | HSL, Special Biochemistry, 60 Whitfield Street London W1T 4EU, Tel: 020 7380 9405 |  |
| **Cannabis** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology, Homerton Hospital, Homerton Row, London, E9 6SR, Tel:0208 510 7889 /7887/7888 | Measured as part of urine drugs of abuse screen |
| **Carbamazepine (Tegretol)** | BY | 0.25ml | 24 hours | 4.0 – 12.0 mg/L | Clinical Biochemistry Dept. Broomfield Hospital, Chelmsford, Essex, CM17ET  Tel: 01245 514159 or 514135 | The sample should be taken immediately before the oral dose |
| **Carbon monoxide (Carboxy Hb)** | BV | 1ml | 24 hours | Non-smokers <1.5%  Smokers 1.5 - 5.0 %  Heavy Smoker 5.0 - 9.0 % | N/A | Collect as soon as possible after exposure in patients being investigated for domestic poisoning. If there is a delay the results may be misleadingly low. |
| **Caeruloplasmin** | BY | 0.5ml | 7 days | 0.20 - 0.60 g/L | Dept. of Medical Biochemistry  University Hospital of Wales  Heath Park, Cardiff, CF14 4XW  Tel: 0292 074 8370 / 2805 | This can be raised in acute infection.  Wilson’s disease rarely presents after the age of 40 years. |
| **Carcinoembryonic antigen (CEA)** | BY | 0.5ml | 24 hours | <5 ug/L | N/A | No specific patient preparation |
| **Catecholamines (24h urine)** | UI | N/A | 10 days | See report nmol/24hr\*  See Diagnosis of Phaeochromocytoma Page 129 | Clinical Biochemistry Dept.  Broomfield Hospital  Chelmsford  Essex CM1 7ET  Tel: 01245 514162/514154 | Preferably patients should avoid coffee (including decaffeinated), tea, bananas, chocolate, cocoa, citrus fruits and vanillas, as well as stress and vigorous exercise, smoking 48 hours prior to collection. Some drugs are known to either increase secretion or decrease secretion of catecholamines. Indicate patient’s drug therapy on the request form. |
| **Chloride** | BY | 0.25ml | 24 hours | 95 - 108 mmol/L | N/A | No specific patient preparation |
| **Conjugated bilirubin** | BY | 0.25ml | 24 hours | 0-9 mmol/L | N/A | No specific patient preparation.  If a patient is found to have a raised total bilirubin, the laboratory will automatically reflex a conjugated bilirubin. |
| **Cholesterol** | BY | 0.25ml | 24 hours | < 5.18mmol/L | N/A | If cholesterol is requested as part of a lipid profile then patient must fast for 12 hours prior to blood collection (for follow up tests diabetic patients may not need to fast). Patients do not need to fast if cholesterol only (total and HDL) is requested.  An acute phase response may give misleading results. For example, cholesterol should be measured at the time of admission with chest pain rather than the following day. |
| **Copper** | BB  or  BY  SR | 2ml | 12 days | 11 - 22 mmol/L\* | Dept. of Medical Biochemistry  University Hospital of Wales  Heath Park, Cardiff, CF14 4XW  Tel: 0292 074 8370 / 2805 | No specific patient preparation |
| **Adjusted calcium**  (Calculated) [\*2](#_*2_Calculated_parameters) | BY | N/A | 24 hours | 2.2 - 2.6 mmol/L | N/A | This is a calculated result adjusted for albumin concentration |
| **Cortisol (24hr. urine)** | U2 | N/A | 10 days | See report | ViaPath  Dept of Clinical Biochemistry  King’s College Hospital  Denmark Hill  London SE5 9RS  Tel@ 0203 299 3576 | No specific patient preparation. |
| **Cortisol 9am** | BY | 0.5ml | 24 hours | 101 - 536nmol/L | N/A | Cortisol shows considerable diurnal variation and samples must be collected between 8.00am and 9.00am for meaningful results to be obtained |
| **C peptide** | BY  SR | 1.25ml | 10 days | See report | ViaPath  Dept of Clinical Biochemistry  King’s College Hospital, Denmark Hill, London SE5 9RS, Blood sciences central reception 0203 299 3576 | The sample must be brought to the laboratory immediately. For investigation of hypoglycaemia, a grey top (fluoride) sample must be taken simultaneously for glucose measurement. C peptide will not normally be analysed unless simultaneous glucose analysis shows hypoglycaemia (< 2.5 mmol/L by laboratory assay) |
| **Creatinine** | BY | 0.25ml | 24 hours | Female: 53 - 97 mmol/L  Male: 62 - 115 µmol/L\* | N/A | No specific patient preparation |
| **Creatinine (24h urine)** | U2 | N/A | 24 hours | mmol/24hr | N/A |  |
| **Creatinine clearance** | U2 and BY | N/A | 24 hours | 78-120 ml/min | N/A |  |
| **Creatine kinase (CK)** | BY | 0.25ml | 24 hours | Female: 25 - 175 U/L | N/A | Occasionally, a high CK may be the result of a patient having circulating macro-CK complexes. Please contact the laboratory to discuss if persistently raised CK level without obvious cause. |
| **C-reactive protein (CRP)** | BY | 0.25ml | 24 hours | 0 - 5 mg/L | N/A | No specific patient preparation. Generally, repeat CRP measurement within 3 days is not clinically useful. Repeat CRP within a day will be rejected. |
| **Cryoglobulin** | BY | 9ml | 7 days | See report | N/A | Pre-analytical factors, such as sample handling, can affect the cryoglobulin result. Therefore, it is important that patient is bled only between 9.00am and 12.00pm so that sample can be appropriately handled. Clinician is advised to contact the laboratory on 01279 973 376 |
| **CSF Glucose** | BG | 0.25ml  (5 drops) | 24 hours | 2/3 of blood concentration | N/A | CSF glucose cannot be interpreted without concurrent blood glucose. |
| **CSF Protein** | U3 | 0.25ml  (5 drops) | 24 hours | 0.15 - 0.45 g/L | N/A | CSF protein results on bloodstained samples are unreliable. |
| **CSF Xanthochromia** | U3  SR | 1ml  (20 drops) | 2 hours | See report | N/A | Sample tube packs supplied by biochemistry should be used at all times. CSF must be sampled at least 12 hours after a suspected event.  At least four or preferably five samples of CSF should be collected consecutively at lumbar puncture and clearly labelled with the order of collection. The last fraction is the preferred sample for Xanthochromia and should be protected from light and transferred to the lab by hand (air-tube transport should be avoided). |
| **Cyclosporin** | BE | 2ml | 8 days | See report | Barts Health, 4th Floor Clinical Biochemistry, 80 Newark Street, Royal London Hospital  Whitechapel London E1 2ES  Tel: 020 3246 0385 | Samples should be collected before next dose (trough). Please indicate dose and time of last dose on the request form. |
| **Cystine stone** |  | N/A | 8 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 |  |
| **Cystine urine** | U3 | 10ml | 13 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London, W1T 4EU, Tel: 020 7380 9405 | Acid or non-acidified urines are accepted. |
| Dehydroepi-androsterone sulphate (DHEAS) | BY | 1ml | 14 days | Adult males:  2.2 - 15.2 umol/L  Adult females:  0.9 – 11.6 umol/L\* | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | No specific patient preparation.  This may not be analysed if testosterone is within the reference range. |
| **Dihydrotestosterone** | BY | 4ml | 42 days | 0.3 - 0.93 nmol/L | Barts Health, Endocrine Bench  4th Floor Clinical Biochemistry  80 Newark Street, Royal London Hospital, London,  E1 2ES Tel: 020 3246 0385 | Useful only if 5 alpha reductase deficiency is suspected. |
| **Digoxin  (6 ho**u**rs post-dose)** | BY | 0.25ml | 24 hours | 0.5 - 1.0 µg/L | N/A | The sample should be taken 6-8 hours after last dose. Note: DIGIBIND interferes with digoxin measurement. Thus, serum digoxin concentration measurement can be clinically misleading until DIGIBIND is eliminated from the body. Depending on the renal function, minimum of 5 days needs to be allowed prior to sampling for digoxin. |
| **Drugs of abuse** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology,  Homerton Hospital, London,  E9 6SR  Tel:0208 510 7889/7887/7888 | Only done if required for medical management. If required for medico-legal purpose, please contact Homerton laboratory for further advice |
| EGFR – (Calculated) [\*2](#_*2_Calculated_parameters) | BY | 0.25ml | 24 hours | See report | N/A | Derived from Creatinine |
| E**panutin (Phenytoin)** | BY | 0.25ml | 24 hours | 5 -20 mg/L | N/A | The sample should be taken immediately before the oral dose. |
| **Epilim (Valproate)** | BY | 0.25ml | 24 hours |  | N/A | Samples should be collected before next dose (trough). Note: Blood levels have a very poor correlation with clinical effect. |
| **Erythropoietin** | BY | 0.5ml | 7 days | 5 to 25 U/L | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill  London SE5 9RS  Tel: 0203 299 3576 |  |
| **Ethosuximide** | BY | 0.5ml | 6 days | See report | Therapeutic Drug Monitoring Unit, Chalfont Centre for Epilepsy, Chalfont St Peter  Chesham Lane, Buckinghamshire SL9 0RJ  Tel: 01494 601423 | The sample should be taken immediately before the oral dose. |
| Faecal Calprotectin | U3 | Approx. 1g | 10 days | <50 µg/g faeces - this is not applicable to neonatal samples. | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | Samples grossly contaminated with blood are unsuitable for FCALP analysis. |
| F**aecal elastase** | U3 | ¼ of container | 10 days | Normal: 200 - >500 µg E1/g faeces  Moderate to mild exocrine pancreatic insufficiency: 100 – 200 µg E1/g faeces  Severe exocrine pancreatic insufficiency: <100 µg E1/g faeces | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | Please note that if faecal calprotectin is also requested a separate sample is required.  Samples grossly contaminated with blood and/or a lot of fibrous matter, hard stools, mucous samples, neonatal samples and watery stool samples are unsuitable for E1 assay. |
| **Faecal porphyrins**  **(protect from light)** | S1 | ¼ of container | 10 days | NEG | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | The sample should be protected from light |
| **Ferritin** | BY | 0.25ml | 24 hours | 20 - 275 mg/L | N/A | No specific patient preparation.  In acute infection ferritin will be raised. |
| **Fluid glucose** | FG | 0.25ml | 24 hours | No reported ranges g/L | N/A |  |
| **Fluid potassium** | U3 | 0.25ml | 24 hours | No Reported ranges mmol/L | N/A |  |
| **Fluid protein** | U3 | 0.25ml | 24 hours | No Reported ranges g/L | N/A |  |
| **Fluid sodium** | U3 | 0.25ml | 24 hours | No Reported ranges mmol/L | N/A |  |
| **Fluid urea** | U3 | 0.25ml | 24 hours | No Reported ranges mmol/L | N/A |  |
| **Follicle stimulating hormone (FSH)** | BY | 0.5ml | 24 hours | Female: 3.0 - 8.0 U/L  Male: 0.9 - 11.9 U/L | N/A | In menstruating females, the sample needs to be taken during early follicular phase (e.g. first week of the cycle). FSH is suppressed in patients taking combined oral contraceptive pill. |
| **Free light chains (FLC)**  (Calculated) [\*2](#_*2_Calculated_parameters) | BY | 1ml | 5 days | See Report  In dialysis-dependent renal failure the kappa/lambda ratio reference range  increases serum FLC. | ViaPath  Dept of Clinical Biochemistry  King’s College Hospital, Denmark Hill  London SE5 9RS  Blood sciences central reception  0203 299 3576 | In <1% of patients with high levels of serum FLC these are missed by this assay because of antigen excess. Any anomaly between the serum FLC results and other lab tests and/or clinical evidence should be reported to the laboratory for re-testing the serum FLC. All tests are compromised by prolonged transit times. For this reason, date of bleed and date of postage must be provided with each request. |
| **FT4 (free thyroxine)** | BY | 0.5ml | 24 hours | 9 - 20 pmol/L\* | N/A | No specific patient preparation.  Free T4 is automatically measured if TSH level is abnormal.  If pituitary dysfunction (secondary hypothyroidism) is suspected TSH and FT4 should be measured. |
| **FT3 (free triiodothyronine)** | BY | 0.5ml | 5 days | 2.5 - 5.7 pmol/L | N/A | No specific patient preparation. |
| G**amma glutamyl transpeptidase (GGT)** | BY | 0.25ml | 24 hours | Male <55U/L  Female <38U/L | N/A | No specific patient preparation. |
| **Gastrin (fasting)** | BE  SR | 5ml | 20 days | <40 pmol/L | The SAS Laboratories Clinical Biochemistry and Medical Oncology  Charing Cross Hospital  London W6 8RF  Tel: 0203 3311 1468 | Patient should be **fasting**. H2 antagonists should be stopped for 72 hours, and omeprazole for 2 weeks. Samples should be brought to the laboratory immediately. |
| **Gentamicin**  **(once daily dose)** | BY | 0.25ml | 6 hours | <1mg/L (18hrs post dose) | N/A | Once a day dose – either 18 hours post or 6 hours pre-dose. |
| **Globulins**(Calculated) [\*2](#_*2_Calculated_parameters) | BY | N/A | 24 hours | 24 - 37 g/L | N/A | This is calculated using the total protein and albumin values. |
| **Glucagon** | BE  SR | 5ml | 20 days | <50 pmol/L | The SAS Laboratories Clinical Biochemistry and Medical Oncology, Charing Cross Hospital, London W6 8RF  Tel: 0203 3311 1468 | Patient should be fasting. |
| **Glucose**  **(fasting)** | BG | 0.25ml | 24 hours | 3.0 - 6.0 mmol/L | N/A | Ideally, test should be performed when patient is fasting (overnight for 12 hours). |
| **Glucose**  **(non-fasting)** | BG | 0.25ml | 24 hours | 3.0 - 7.7 mmol/L | N/A | No specific patient preparation. |
| **Glucose Tolerance Test** | BG | 0.25ml | 24 hours | <7.8 mmol at 2 hours | N/A | Three days of unrestricted diet (>150g carbohydrate per day) and physical activity should be allowed before the test.  Any drugs which may influence the result should be withdrawn for 3 days before the test.  Fast patient overnight (Plain water only allowed). |
| **Glycated Haemoglobin (HbA1c)** | BE | 1ml | 3 days | 20 - 42 mmol/mol [\*1](#_*1_HbA1c) | Only if Hb variant interference suspected. BROOMFIELD Haem. | No specific patient preparation |
| **Growth hormone** | BY | 2ml | 10 days | 0 - 7 µg/L | Barts Health, Endocrine Bench  4th Floor Clinical Biochemistry, 80 Newark Street, Royal London Hospital, London  E1 2ES, Tel: 020 3246 0385 | Random GH levels are of limited value due to pulsatile release. |
| **Haptoglobin** | BY | 1ml | 6 days | 0.3 - 2.0 g/L | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street  London W1T 4EU  Tel: 020 7380 9405 | Patient should be **fasting**. Samples should be brought to the laboratory immediately.  This may not be analysed if total bilirubin is within reference range. |
| **HDL Cholesterol** | BY | 0.25ml | 24 hours | Female: 1.0 - 2.0 mmol/L  Male: 0.9 - 2.0 mmol/L | N/A | Patients do not need to fast if cholesterol only (total and HDL) is requested.  If HDL cholesterol is requested as part of a lipid profile then patient must fast for 12 hours prior to blood collection (for follow up tests diabetic patients may not need to fast). |
| HLA B27 | BE | 10ml | 14 days | See Report | Viapath, Clinical Transplantation Department Guy's Hospital, Great Maze Pond, London SE1 9RT  020 7188 1534 |  |
| Homocysteine | BV  SR | 0.2ml | 10 days | 5.0 – 12.0 umol/L | Neurometabolic Unit (box 105)  The National Hospital for Neurology and Neurosurgery  Queen Square, London,  C1N 3BG, Tel: 020 344 83818 | The sample should be brought to the laboratory immediately as delay in sample centrifugation leads to increased homocysteine values. |
| IgA | BY | 0.75ml | 24 hours | <45yrs: 0.8 – 2.8 g/L  >45yrs: 0.8 – 4.0 g/L\* | N/A | No specific patient preparation |
| **IgE** | BY | 0.5ml | 24 hours | 3 – 150 U/mL\* | N/A | No specific patient preparation |
| **IgG** | BY | 0.75ml | 24 hours | 6.0 – 16.0g/L\* | N/A | No specific patient preparation |
| **IgM** | BY | 0.75ml | 24 hours | 0.5 – 2.0 g/L | N/A | No specific patient preparation |
| **Insulin-like growth factor 1 (IGF-1)** | BY  SR | 1ml | 10 days | See report | Barts Health, 4th Floor Clinical Biochemistry, 80 Newark Street, Royal London Hospital  Whitechapel London E1 2ES  Tel: 020 3246 0385 | No specific patient preparation.  The sample should be brought to the laboratory immediately. |
| **Insulin** | BR or BY  (BG) | 1ml | 10 days | 4.4 - 26 mIU/L | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | The sample must be brought to the laboratory immediately. Sample needs to be separated within I hour of bleeding  For investigation of hypoglycaemia, a grey top (fluoride) sample must be taken simultaneously. C peptide will not normally be analysed unless simultaneous glucose analysis shows hypoglycaemia (< 2.5 mmol/L by lab assay). |
| **Iron** | BY | 0.5ml | 24 hours | Female 9 - 34 umol/L  Male 11.6 - 31.3 umol/L |  |  |
| L**actate** | BG | 0.5ml | 24 hours | 0.5 - 2.2 mmol/L | N/A | No specific patient preparation |
| **Lactate dehydrogenase (LDH)** | BY | 0.25ml | 24 hours | 125 - 220 U/L | N/A | No specific patient preparation.  In vitro haemolysis will artefactually increase levels. |
| **Lamotrigine** | BY | 0.5ml | 6 days | 4 - 60 mmol/L | Therapeutic Drug Monitoring Unit, National Society for Epilepsy, Chalfont St Peter, Chesham Lane,  Buckinghamshire SL9 0RJ  Tel: 01494 60  1423 | Samples should be collected before next dose (trough) |
| **LDL Cholesterol** (Calculated) [\*2](#_*2_Calculated_parameters) | BY | N/A | 24 hours | < 3.0 mmol/L | N/A | Patients must fast for 12 hours prior to blood collection (for follow up tests diabetic patients may not need to fast, but levels may be decreased as a result of recent food intake).  LDL cholesterol is a calculated from other lipid parameters.  *LDL Cholesterol = Total Cholesterol - HDL Chol. - (Triglycerides / 2.19)*.  LDL cannot be calculated when triglyceride levels are > 4.5 mmol/L |
| **Lead** | **BE** | 2ml | 12 days | < 0.5 mmol/L | Dept. of Medical Biochemistry  University Hospital of Wales  Heath Park, Cardiff, CF14 4XW, Tel: 02920 748 370 | No specific patient preparation |
| **Lithium** | BY | 0.25ml | 24 hours | 0.4 – 1.0 mmol/L | N/A | Samples should be taken 12 hours after last dose. Steady state levels are achieved 4 days following a change in dose. |
| **Luteinising hormone (LH)** | BY | 0.5ml | 24 hours | Female: 2 - 7 U/L  Male: 1 – 10 U/L | N/A | In menstruating females, the sample needs to be taken during early follicular phase (e.g. first week of the cycle).  LH is suppressed in patients taking combined oral contraceptive pill. |
| M**agnesium** | BY | 0.25ml | 24 hours | 0.7 – 1.0 mmol/L | N/A | No specific patient preparation.  Haemolysis or a prolonged delay in separation of serum from red cells can cause an artefactual increase in magnesium concentration. |
| **Methadone** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology  Homerton University Hospital  Homerton Row, London,  E9 6SR  Tel:0208 510 7889/7887/7888 | Measured as part of urine drugs of abuse screen. |
| **Microalbumin urine screen (early morning urine)** | U3 | 5ml | 2 days | Female: 0 - 3.5 mg/mmol creatinine | N/A | Patients should avoid strenuous exercise for 2 days prior to collecting the urine. Samples should not be collected when there are symptoms of UTI or thrush. |
| **Morphine** | U3 | 20ml | 8 days | NIL | Dept. of Chemical Pathology  Homerton University Hospital  Homerton Row  London  E9 6SR  Tel:0208 510 7889 /7887/ 7888 | Measured as part of urine drugs of abuse screen. |
| O**estradiol** | BY | 0.5ml | 24 hours | Female: 77 – 921 pmol/L  Male: 40 - 160 pmol/L | N/A | No specific patient preparation. |
| **Oligoclonal bands serum** | U3  and BY | 2ml | 12 days | See report | Dept. of Neuroimmunology  National Hospital for Neurology  Queens Square, London WC1N 3BG  Tel: 0207 898870 Ext 3813/4 | It is essential that the CSF sample is accompanied by a serum sample taken the same day. |
| **Osmolality serum** | BY | 0.25ml | 24 hours | 275 – 295 mmol/kg | N/A | * No specific patient preparation. * For investigation of some conditions (e.g. Diabetes Insipidus and SIADH), paired serum and urine osmolality samples are required.   The laboratory should be informed prior to undertaking a water deprivation test |
| **Osmolality urine** | U3 | 5ml | 24 hours | Interpret in conjunction with serum osmolality. | N/A | No specific patient preparation.  For investigation of some conditions (e.g. Diabetes Insipidus and SIADH), paired serum and urine osmolality samples are required.  The laboratory should be informed prior to undertaking a water deprivation test. |
| **Oxalate (24h urine)** | U1 | N/A | 10 days | See Individual Report\* | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 | No specific patient preparation. |
| **Oxalate stone** | U3 | N/A | 10 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 |  |
| **Paracetamol at 4 hours** | BY | 0.25ml | 6 hours | Refer to treatment graph | N/A | Sample must be taken 4 hours or more after ingestion. Levels taken before 4 hours cannot be reliably interpreted because of the possibility of continuing absorption and distribution of the drug. |
| **Paraprotein typing serum** | BY | N/A | 7 days | See report | N/A | Haemolysed samples are unsuitable. |
| **Paraprotein typing urine** | U3 | N/A | 14 days | See report | N/A | An early morning urine is required. |
| **PTH** | BE | 0.5ml | 24 hours | > 17yrs: 3.0 - 12.0 pmol/L.  ≤ 17yrs: 1.6- 7.2pmol/L | N/A | A concurrent calcium is required to interpret PTH except in renal patients. |
| **PC02** | HS | 1ml | 24 hours | 4.67 - 6.0 kPa | N/A | Not available in the laboratory but can be measured on blood gas analysers. |
| **pH** | HS | 1ml | 24 hours | 7.35 - 7.45 | N/A | Not available in the laboratory but can be measured on blood gas analysers. |
| **Phenobarbitone** | BY | 0.25ml | 10 days | 10 - 40 mg/L | Clinical Biochemistry Dept.  Broomfield Hospital, Chelmsford  Essex CM1 7ET  Tel: 01245 514162/514154 | The sample should be taken immediately before the oral dose. |
| **Phenytoin (Epanutin)** | BY | 0.25ml | 24 hours | 5 - 20 mg/L | N/A | The sample should be taken immediately before the oral dose. |
| **Phosphate** | BY | 0.25ml | 24 hours | 0.8 - 1.5 mmol/L | N/A | Ideally patient should be fasting. Haemolysis or a prolonged delay in separation of serum from red cells can cause an artefactual increase in phosphate concentration. |
| **Phosphate stone** | U2 | N/A |  | See report | N/A |  |
| **Porphobilinogen** | U3SR | 20ml | 24 hours | NEG | Dept. of Medical Biochemistry  University Hospital of Wales, Cardiff, CF14 4XW  Tel: 02920748370/2805  **BEDFORD if urgent (24hrs)**  Porphyria Service, Bedford Hospital, Kempston Road, Bedford, Tel: 01234 792628 | The sample should be protected from light. Collect at time of symptoms if possible. |
| **Porphyrin urine screen** | U3  SR | 20ml | 2 days | 0-35 nmol/mmol creat | The sample should be protected from light. |
| **Porphyrins faeces** | S1  SR | ¼ of the container | 5 - 7 days | NEG | The sample should be protected from light. |
| **Potassium 24 hr urine** | U2 | N/A | 24 hours | Varies mmol/24hr | N/A | No specific patient preparation |
| **Potassium** | BY | 0.25ml | 24 hours | 3.5 – 5.3 mmol/L | N/A | Haemolysis or a prolonged delay in separation of serum from red cells can cause an artefactual increase in potassium concentration. In patients with high white cells and platelets potassium is released leading to a falsely elevated potassium |
| **Potassium fluid** | U3 | 0.25ml | 24 hours | No range reported  mmol/L | N/A |  |
| **Potassium spot urine** | U3 | 5ml | 24 hours | No range reported  mmol/L | N/A | A concurrent serum potassium is required to interpret results. |
| **Progesterone** | BY | 0.5ml | 24 hours | >30 nmol/L | N/A | If assessing ovulation, progesterone is assessed on day 21 (if a 28-day cycle or 7 days prior to next cycle). |
| **Procollagen type III peptide** | BY | 1ml | 10 days | See report mg/L | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | No specific patient preparation. |
| **Prolactin** | BY | 0.5ml | 24 hours | Female: 109 - 557mU/L  Male: 73 - 407 mU/L | N/A | No specific patient preparation. |
| **PSA** | BY | 0.5ml | 24 hours | 0 -4 mg/L | N/A | Urological manipulations affect PSA levels and if possible, sample should be taken before procedure. |
| **Protein** | BY | 0.25ml | 24 hours | 60 – 80 g/L | N/A | No specific patient preparation. |
| **Protein (24h urine)** | U2 | N/A | 24 hours | 0.0 – 0.15g/24 hr | N/A | No specific patient preparation. |
| **Protein CSF** | U3 | 0.25ml  (5 drops) | 24 hours | 0.15-0.45 g/L | N/A | No specific patient preparation.  CSF protein results on bloodstained samples are unreliable. |
| **Protein creatinine ratio (early morning urine)**  (Calculated) [\*2](#_*2_Calculated_parameters) | U3 | 5ml | 24 hours | <15 mg/mmol | N/A | Early morning urine preferred |
| **Protein electrophoresis** | BY | 1ml | 72 hours | See report | N/A | No specific patient preparation.  Haemolysed samples are unsuitable |
| **Procalcitonin** | BY | 0.25ml | 1 day | See report | N/A | Must be followed up by at least 1 further sample after initial request due to the lag phase for PCT. |
| R**AST** | BY | 0.1ml per allergen plus 0.1ml dead volume | 10 days | See report | Immunology Dept, HSL Laboratories, The Halo Building, 1 Mabledon Place  London WC1H 9AX,  Tel: 02073077373 | No specific patient preparation. |
| **Renal calculus** | U3 | N/A | 8 days | see report | HSL, Special Biochemistry  UCLH NHS Foundation Trust, 60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 |  |
| **Renin (random)** | B3 | 1.25ml | 10 days | Renin (µ/L):  Upright 5.4 - 60 Supine 5.4 – 30  Aldo/Renin ratio:  <80: Conn’s unlikely. >/=200: Conn’s likely. 80-200: Conn’s not excluded | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | B-blockers, ACEi/A2RB, CCB and diuretics should be stopped for 2 weeks prior to sampling. Spironolactone should be stopped for 6 weeks. An alpha blocker such as doxazosin may be substituted. Severe hypokalaemia (plasma potassium less than 2.9mmol/L) should be corrected prior to sampling. Potassium supplements should be stopped 24 hour prior to sampling. The patient should rest for 15 minutes prior to sampling and be in a sitting position. Samples should be taken to the laboratory immediately |
| **Reducing substances faeces** | S1  SR | ¼ of the container | 10 days | NIL | Chemical Pathology  Camellia Botnar Laboratories  Great Ormond St Hospital for Children, Great Ormond St, London WC1N 3JH  Tel: 020 7405 9200 Ext 5009 | Fresh faecal sample should be brought to the lab immediately. |
| **Reducing substances urine** | U3 | 5ml | 10 days | NIL | Chemical Pathology  Camellia Botnar Laboratories  Great Ormond St Hospital for Children, Great Ormond St, London WC1N 3JH  Tel: 020 7405 9200 Ext 5009 | Fresh urine sample should be brought to the lab immediately. |
| S**alicylate (therapeutic)** | BY | 0.25ml | 6 hours | 150 – 300 mg/L | N/A | No specific patient preparation. |
| **Serum protein electrophoresis** | BY | 1ml | 10 working days  Max TAT: 3 days | See report | N/A | Haemolysed samples are unsuitable. |
| **Sex hormone binding globulin (SHBG)** | BY | 0.5ml | 24 hours | 4.5 - 250nmol/L | N/A | No specific patient preparation. Testosterone is required to interpret results. Free Androgen Index is calculated from Testosterone & SHBG (Calculated)[\*2](#_*2_Calculated_parameters) |
| **Sodium (24h urine)** | U2 | N/A | 24 hours | 40 - 220mmol/24hrs | N/A |  |
| **Sodium (serum/plasma)** | BY/BV | 0.5ml | Urgent:  <1 hour  Inpatients:  4 hours  GP/OPD  24 hours | Range (mmol/L):  Premature, Cord: 116 - 140  Premature, 48h: 128 - 148  Newborn, Cord: 126 - 166  Newborn: 133 - 146  Infant: 139 - 146  Child: 138 - 145  Thereafter: 133 - 146 | N/A |  |
| **Sodium fluid** | U3 | 0.25ml | 24 hours | mmol/L | N/A |  |
| **Sodium spot urine** | U3 | 5ml | 24 hours | mmol/L | N/A | Concurrent serum sodium is required to interpret. |
| **Steroid profile**  **(early morning urine)** | U2 | 20ml | 12 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 | Neonatal samples must be 3 days post natal |
| **Stone analysis** | U3 | N/A | 8 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust  60 Whitfield Street, London W1T 4EU, Tel: 020 7380 9405 |  |
| **Testosterone** | BY | 0.5ml | 24 hours | Female: 0.4 - 2.0nmol/L  Male: 8 - 32nmol/L | N/A | Samples should ideally be collected early morning between 9 and 10 am in males.  Free Androgen Index is calculated from Testosterone & SHBG (Calculated)[\*2](#_*2_Calculated_parameters) |
| **Theophylline (aminophylline)** | BY | 0.25ml | 24 hours | 10- 20 mg/L | N/A | The blood samples MUST be taken at the correct time relative to the dose of drug. Slow release preparations 8hrs post dose others before next dose. IV infusion at 6 & 18 hours. |
| **TSH** | BY | 1ml | 24 hours | 0.35 - 5.0 mU/L | N/A | No specific patient preparation.TSH is used as a 1st line screening test and Free T4 is automatically measured if TSH level is abnormal. |
| **Thyroxine – FT4** | BY | 0.75ml | 24 hours | 9 - 20 pmol/L | N/A | No specific patient preparation.  Free T4 is automatically measured if TSH level is abnormal  If pituitary dysfunction (secondary hypothyroidism) is suspected TSH and FT4 should be measured. |
| **Tri-iodothyronine (FT3)** | BY | 0.75ml | 24 hours | 2.5 - 5.7 pmol/L | N/A | No specific patient preparation. |
| **Transferrin** | BY | 0.25ml | 24 hours | 2.1 - 3.6g/L | N/A | No specific patient preparation. |
| **Transferrin saturation**  (Calculated)[\*](#_*2_Calculated_parameters)[2](#_*2_Calculated_parameters) | BY | 0.25ml | 24 hours | 20 - 40% | N/A | No specific patient preparation. |
| **Troponin I**  **(high sensitivity)** | BY | 0.5ml | 24 hours | Refer to cardiology chest pain algorithm | N/A | Not suitable for primary care. |
| **Tryptase** | BE | 0.3ml | 10 days | 2 - 14 μg/L | Department of Immunology, PO Box 894, Sheffield, S5 7YT  Tel: 0114 271 5552 | Additional samples should be taken at 3hr & 24hr. |
| **Triglyceride** | BY | 0.25ml | 24 hours | <1.7 mmol/L | N/A | Patients must fast for 12 hours prior to blood collection (for follow up tests diabetic patients may not need to fast, but levels may be increased as a result of recent food intake). |
| U**rate** | BY | 0.25ml | 24 hours | Male 220 – 450 umol/L  Female 150 -370 umol/L | N/A | No specific patient preparation. |
| **Urate (24h urine)** | U2 | N/A | 2 days | 1.5 - 4.5 mmol/24hr | N/A | No specific patient preparation. |
| **Urate stone** | U3 | N/A | 8 days | See report | HSL, Special Biochemistry  UCLH NHS Foundation Trust’ 60 Whitfield Street, London W1T 4EU  Tel: 020 7380 9405 |  |
| **Urea** | BY | 0.25ml | 24 hours | 2.5 - 7.8 mmol/L | N/A | No specific patient preparation. |
| **Urea (24h urine)** | U2 | N/A | 24 hours | 428 - 714 mmol/24hr | N/A | No specific patient preparation. |
| **Urea spot urine** | U3 | 5ml | 24 hours | mmol/L | N/A | No specific patient preparation. |
| **Uric acid (24h urine)** | U2 | N/A | 2 days | 1.5 - 4.5 mmol/24hr | N/A | No specific patient preparation. |
| **Urine albumin/creatinine ratio**(Calculated)[\*](#_*2_Calculated_parameters)[2](#_*2_Calculated_parameters) | U3 | 1ml | 24 hours | See report | N/A | Early Morning Urine (EMU) required |
| **Urine cortisol excretion** | U2 | N/A | 10 days | 40 – 340 nmol/24hr | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill  London SE5 9RS  Blood sciences central reception  0203 299 3576 | No specific patient preparation. Ensure complete 24-hour collection. |
| **Urine magnesium**  **(24h urine)** | U2 | N/A | 2 days | 2.4 – 6.5 mmol/24hr | N/A | No specific patient preparation. |
| **Urine mercury** | U2 | N/A | 12 days | < 50nmol/24 hr | Dept. of Medical Biochemistry  University Hospital of Wales  Heath Park, Cardiff, CF14 4XW  Tel: 02920 748 370  02920 742805 | No specific patient preparation. |
| **Valproate (Epilim)** | BY | 0.25ml | 24 hours | mg/L | N/A | Samples should be collected before next dose (trough). Note: Blood levels have a very poor correlation with clinical effect.  Studies have shown that blood levels have a very poor correlation with clinical effect. The therapeutic range can be misleading as patients may be well controlled at concentrations below or above the range. Therefore, following recommendation from Pathology Harmony, reference range for valproate is not reported. |
| **Vancomycin (pre-dose)** | BY | 0.25ml | 24 hours | 5 - 15 mg/L | N/A | PRE-immediately before next dose |
| **Vancomycin (post-dose)** | BY | 0.25ml | 24 hours | 18 - 26 mg/L | N/A | POST-2 hours post dose |
| **Vit B1, B2, B3 & B6** | BE | 4ml | 5 days | As in the report | ViaPath, Dept of Clinical Biochemistry, King’s College Hospital, Denmark Hill, London SE5 9RS, Tel: 0203 299 3576 | Protected from light and freeze on ice. |
| **VIP (fasting)** | BE  SR | 5ml | 25 days | <30 pmol/L | The SAS Laboratories  Clinical Biochemistry and Medical Oncology, Charing Cross Hospital, London W6 8RF, Tel: 02033311 1468/1234 | Patient should be **fasting**. Samples should be brought to the laboratory immediately. |
| **Vit A** | BY  SR | 4ml | 17 days | 1.05 - 2.27 umol/L | Dept. of Neuroimmunology  National Hospital for Neurology, Queens Square, London WC1N 3BG  Tel: 0207 898870 Ext 3813/4 | Protect sample from light and bring to the laboratory immediately. |
| **Vit D (25 Hydroxy cholecalicferol)** | BY | 0.5ml | 24 hours | 50 - 150 nmol/L | N/A | No specific patient preparation. |
| **Vit E** | BY  SR | 4ml | SA | 11.5 - 46.4 umol/L | Dept. of Neuroimmunology, National Hospital for Neurology, Queens Square, London WC1N 3BG  Tel: 0207 898870 Ext 3813/4 | Protect sample from light and bring to the laboratory immediately. |
| Z**inc** | BB  SR | 2.0ml | 12 days | 8 - 17 mmol/L | Dept. of Medical Biochemistry  University Hospital of Wales  Heath Park, Cardiff, CF14 4XW, Tel: 02920 748 370  02920 742805 | Bring sample to the laboratory immediately. |
| **5 HIAA (24h urine)** | UI | N/A | 10 days | 10 – 50 mmol/24hr | Clinical Biochemistry Dept.  Broomfield Hospital  Chelmsford, Essex CM1 7ET  Tel: 01245 514162/514154 | Foods rich in serotonin may affect the 5-HIAA assay and cause false positives. The following foods should be avoided for 24 hours before the collection begins, and during the collection itself:  Banana, tomato, avocado, plums, walnut, aubergine and chocolate. Drugs which may affect the result include; Reserpine (serpasil) and mephenesin carbamate. |
| **17 Hydroxy progesterone (17OHP)** | BY | 4ml | 10 | 1.0 – 10.0 nmol/L | Barts Health 4th Floor Clinical Biochemistry, Pathology and Pharmacy Building, 80 Newark Street, Royal London Hospital  Whitechapel London E1 2ES  Tel: 020 3246 0385 | In those below 1 year old a plain sample tube should be used which can be collected from the laboratory. Take blood before emergency administration of corticosteroids and preferably early morning. Samples should not be taken in newborn infants until at least 72 hours after birth. Blood should be taken basal and at 30 minutes and 60 minutes following Synacthen. |

### **\*1**HbA1c

An HbA1c of **48 mmol/mol is** recommended as the cut point for diagnosing diabetes. A value of

The following ranges are used in monitoring:

* 20 – 42 mmol/mol Excellent diabetic control.
* 48 – 59 mmol/mol Target for diabetics
  + 64 mmol/mmol poor control.
* Patients with results lower than <20 mol/mol may be at risk of hypoglycaemia

Please note: Uncommon haemoglobin variants may interfere with the measurement of HbA1c by the current method. In such cases, sample is sent for analysis by Boronate affinity chromatography. The common Haemoglobin variants C, S, D and E have no interference on the current method.

### \*2 Calculated parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Calculated Parameter (units)** | **Expansion/ other terms** | **Sample type** | **Equation** | **Source** |
| LDL (mmol/L) | Low density lipoprotein cholesterol | Serum | LDL cholesterol = (Total cholesterol) - (HDL cholesterol)- (Triglyceride/2.22) | Friedewald equation |
| eGFR (ml/min) | Estimated glomerular filtration | Serum | 175 x ({Creat}/ 88.4)^ -1.154 x (Age)^-0.203 x (0.742 if **female**)  175 x ({Creat}/ 88.4)^-1.154 x (Age)^-0.203 x (1.0 if **male**) | Modified MDRD |
| Adjusted calcium (mmol/L) | Calcium adjusted for albumin | Serum | (albumin – 40) x 0.02 + calcium  Calcium – (40 – albumin) x 0.02 | Tietz |
| UPCR | Urine protein/creatinine ratio | Urine | (urine protein / urine creatinine) x1000 | N/A |
| ACR | Urine albumin/creatinine ratio | Urine | Urine albumin (microalbumin) / urine creatinine | N/A |
| Transferrin saturation (%) | Total iron binding capacity | Serum | Iron [umol/l] x 3.98) / transferrin {g/l | Tietz |
| Globulin |  | Serum | Total protein – albumin | N/A |
| FAI | Free androgen Index | Serum | (Testosterone/SHBG) x 100 | Tietz |
| KLR | Serum Kappa/Lambda ratio | Serum | Serum kappa/Serum lambda | N/A |

## Minimum retesting guidance used by chemical pathology

[Click here for information on Minimum Re-Testing Guidance used by the Chemical Pathology Department](https://www.rcpath.org/static/253e8950-3721-4aa2-8ddd4bd94f73040e/g147_national-minimum_retesting_intervals_in_pathology.pdf)

## Frequently Used Dynamic & Special Test Protocols

Some more commonly used dynamic test protocols are given below. For all other protocols please contact the laboratory.

Please use the special form designed for dynamic tests.

Write dynamic test name and the sampling times clearly on the request form.

### **Oral Glucose Tolerance Test** (for the diagnosis of diabetes mellitus)

**Indication**

The diagnosis of diabetes is made on the basis of an elevated fasting or post-prandial plasma glucose concentration in a symptomatic subject or two elevated concentrations in an asymptomatic subject. The oral glucose tolerance test is only used when such measurements are equivocal and is not required for diagnosis in the majority of patients.

**Principle**

In normal individuals, pancreatic insulin secretion maintains blood glucose with a tight concentration range following an oral glucose load. Failure of insulin secretion, or resistance to the action of insulin, will result in elevation in blood glucose.

**Side effects**

Some subjects feel nauseated and may have vaso-vagal symptoms during the test.

**Clinical Procedure**

Three days of unrestricted diet (>150g carbohydrate per day) and physical activity should be allowed before the test.

Any drugs which may influence the result should be withdrawn for 3 days before the test.

Fast patient overnight (Plain water only allowed).

**Laboratory Procedure**

On arrival blood glucose estimation is carried out. If the result is greater than 9mmol/L, the test is discontinued.

113ml of polycal mixed with 140ml of water is administered orally over a period of 5 minutes, (alternatively 75g glucose in 300ml of water). For children under the weight of 42kg, administer 1.75g glucose per kg weight.

Blood samples are taken at before and 2 hours after the glucose load. Patients should sit quietly and refrain from smoking during the test.

**Interpretation**

|  |  |  |
| --- | --- | --- |
| **Diagnosis** | **Time of Sample** | **Glucose mmol/L**  **(Venous Plasma)** |
| Normal | Fasting  2hrs post load | ≤ 6.0  < 7.8 |
| Diabetes Mellitus | Fasting  2hrs post load | ≥ 7.0  ≥ 11.1 |
| Impaired glucose tolerance | Fasting  2hrs post load | 6.1 – 6.9  7.8-11.0 |
| Normal (**pregnant**) | Fasting  2 hr post load | < 7.0  < 7.8 |
| Gestational diabetes | Fasting  2 hr post load | ≥ 7.0  ≥ 7.8 |

Impaired glucose tolerance may be seen in Cushing’s syndrome, steroid therapy and pregnancy, and in patients who have been on a very low carbohydrate diet prior to the test. Some of those with impaired glucose tolerance may later develop Diabetes Mellitus

### Short Synacthen Test

**Indication**

This is performed for the investigation of adrenal insufficiency.

**Principle**

The synacthen stimulation test measures the functional integrity of the adrenal glands and their sensitivity to ACTH stimulation.

Adrenal glucocorticoid secretion is controlled by adrenocorticotrophic hormone (ACTH) released by the anterior pituitary. This test evaluates the ability of the adrenal cortex to produce cortisol after stimulation by synthetic ACTH (tetracosactrin: synacthen). It does not test the pituitary-adrenal axis.

**Procedure**

If a patient is suspected of having Addisonian crisis, take blood sample for electrolytes and cortisol measurement before starting steroid treatment.

Measurement of serum cortisol is not carried out as an emergency investigation and the result is not required for the immediate management of the patient.

Hyponatraemia, hyperkalaemia and uraemia are compatible with an Addisonian crisis, but are not specific. A very high cortisol concentration (>1000nmol/L) excludes Addison’s disease, while a low level (<50nmol/L) in a stressed patient makes the diagnosis very probable.

If the patient is on steroid therapy, miss the morning dose and carry out the test.

Synacthen dose: Tetracosactrin 250ug intramuscularly immediately after obtaining basal sample. If less than 6months 62.5ug, 6 months-2 years 125ug and if older than 2 years adult dose applies for tetracosactrin.

Time 0 30 60 mins

Serum Cortisol √ √ √

**Interpretation**

Normal response: A serum cortisol level of at least 450nmol/L at 30 minutes (Note cut off applicable to Abbott method used in our laboratory). This excludes primary adrenal insufficiency (i.e. Adrenal), but does not exclude hypothalamic or pituitary dysfunction.

An impaired response indicates adrenal hypo-function and a 5hr. Synacthen test and plasma ACTH test should be considered.

### 5-Hours Synacthen Test

This test gives a more accurate assessment of the adrenal reserve capacity and should be performed in patients where the result from the short Synacthen test is equivocal.

**Procedure**

Insert an indwelling venous cannula. After 30 minutes take the basal sample, inject 1mg Depot Synacthen intramuscularly.

Time (hours) 0 1 4 5

Serum Cortisol √ √ √ √

Plasma ACTH at 0 min – EDTA sample taken to the Laboratory immediately.

**Interpretation**

In normal subjects plasma cortisol levels are more than double in the first hour and then rise more slowly to exceed 900nmol/l by 5 hours.

Patients with Addison’s disease show no response while impaired response is seen in patients with hypothalamic or pituitary disease. In this group it is necessary to assess the secretion of other pituitary hormones such as TSH, GH, Gonadotropins and Prolactin.

### **Dexamethasone Suppression Test** (Overnight)

Investigation of suspected Cushing’s syndrome.

**Principle**

The hypothalamic-pituitary-adrenal axis is disturbed in all forms of Cushing’s syndrome with poor or absent suppressibility of cortisol by exogenous glucocorticoid (dexamethasone). This test provides a simple screening procedure which requires one short visit to the outpatient phlebotomy for a blood test.

**Procedure**

Ensure patient is not taking cortisone, a synthetic cortico-steroid analogue or ACTH. Prednisolone will interfere with cortisol assay.

The patient is provided with 1 mg of Dexamethasone (or 1.5mg in adults if over 120% ideal body weight) to be taken between 23.00 hours and 24.00 hours orally.

Next morning at 09.00 hours the patient should attend at outpatients phlebotomy.

The patient should be rested for 30 min and not stressed.

A single blood sample is taken for cortisol measurement.

Send sample to the laboratory for cortisol assay with request form marked with ‘Dexamethasone suppression test’.

**Interpretation**

Suppression of serum cortisol concentration by Dexamethasone to a value <50 nmol/l excludes Cushing’s syndrome in most cases. However, this should not override clinical judgment when there is a very strong suspicion of Cushing’s syndrome. All healthy individuals show normal suppression. 13% of obese controls and 23% of hospitalised chronically ill patients give false positive results (i.e. non-suppression). However, 2% of Cushing’s patients suppress to concentrations <50nmol/l. A false negative result (i.e. ‘suppression’) may occur in Cushing’s syndrome in patients with a very rare condition of abnormally low cortisol binding globulin.

## Diagnosis of Phaeochromocytoma

**Recommended assay** is 24hr urine catecholamines

**Collection requirement**:

A 24-hour urine should be collected into a container (with acid added). For children, a spot urine should be collected into a plain container and brought to the lab for acidification.

**Turnaround time**:

Approx 10 days, although more urgent requests may be accommodated.

**Patient preparation**:

Preferably patients should avoid coffee (including decaffeinated), tea, bananas, chocolate, cocoa, citrus fruits and vanillas, as well as stress and vigorous exercise, smoking 48 hours prior to collection.

Some drugs are known to either increase secretion or decrease secretion of catecholamines. Therefore, it is important to indicate patient’s drug therapy on the request form.

**Interpretation**

The reported incidence of phaeochromocytoma is 1 to 2 per 100,000 adults per year The average NHS district hospital serving a population of 250,000 should therefore see between 2 and 5 new cases per year. Urinary catecholamine analysis by liquid chromatography coupled to amperometric detection has achieved a sensitivity and specificity of 96% and 100% respectively. This specificity is higher than that for VMA and therefore the method of choice for diagnosing phaeochromocytoma is urine free catecholamines (adrenaline, noradrenaline and dopamine). If urinary catecholamines are consistently normal when clinical suspicion is high suggest send urine/plasma metanephrines.

**Reference ranges**

NORADRENALINE 0 - 570 nmol/24hrs

ADRENALINE 0 - 144 nmol/24hrs

DOPAMINE 0 - 3100 nmol/24hrs

## Neuroblastoma in Children

Please note, for urgent diagnosis of neuroblastoma in children, a ‘spot urine’ specimen is recommended. A 24hour collection should be commenced soon after the spot urine is sent to the laboratory

**Investigation: Carcinoid Syndrome**

**Test:** Urinary 5-HIAA

**Sample:** 24 hr Urine collection into bottle containing acid preservative

**Patient instructions:**

Foods rich in serotonin may affect the 5-HIAA assay and cause false positives. The following foods should be avoided for 24 hours before the collection begins, and during the collection itself:

Banana, tomato, avocado, plums, walnut, aubergine and chocolate.

Drugs which may affect the result include:

Reserpine (serpasil) and mephenesin carbmate.

## Investigation of Suspected Conn’s Syndrome (Primary Hyperaldosteronism)

**Indication**

1. Hypertension with spontaneous or diuretic – induced hypokalaemia in presence of a sodium

> 140mmol/l.

Hypertension refractory to 3 or more drugs.

Young hypertensives.

Hypertension in presence of an incidental adrenal adenoma.

N.B. Plasma potassium itself is not a good indicator of which patients need investigation. A significant proportion of patients with primary hyperaldosteronism are normokalaemic.

**Principle**

The renin-aldosterone axis is primarily regulated by renal blood flow. Subjects under investigation should, therefore, not be taking any drugs that interfere with fluid balance or potassium. It is essential for subjects to be normally hydrated and have an adequate oral intake of sodium. Hypokalaemia must be avoided since it suppresses aldosterone secretion. It is important to note that increasing oral sodium intake may cause a considerable increase in urinary potassium excretion.

**Drug interference**

B-blockers, ACEi/A2RB, CCB and diuretics should be stopped for 2 weeks prior to sampling. Spironolactone should be stopped for 6 weeks. An alpha blocker such as doxazosin may be substituted.

**Procedure**

First correct severe hypokalaemia (plasma potassium should not be lower than 2.9mmol/L) and ensure a normal salt intake. Potassium supplements, if given, should be stopped 24 hour prior to sampling.

**Renin: Aldosterone ratio**

The screening test is a random aldosterone: renin ratio (ARR). Measure both plasma aldosterone and plasma renin with patient in a sitting position after resting for 15 minutes. This requires 5ml lithium heparin blood which MUST BE SEPARATED AND FROZEN as soon as possible (Heparin samples should be taken into a plastic tube).

Following additional information should be provided:

* Blood pressure
* Most recent plasma and urine electrolyte results
* Any drug therapies

In primary hyperaldosteronism Plasma renin is suppressed or very low (ref range 5.4 - 60mu/L).

Plasma aldosterone may be raised or within reference range (100 - 800pmol/L)

Aldosterone renin ratio (ARR) < Aldo/Renin ratio: <80: Conn’s unlikely.

>/=200: Conn’s likely.

80-200: Conn’s not excluded

**Further investigation:**

When primary hyperaldosteronism has been established.

Adrenal imaging by CT scan or MRI (possibly the more sensitive technique) should be undertaken to locate the adenoma. The possibility that an observed adenoma may be a non-secreting incidentaloma must be born in mind.

Selective adrenal vein sampling is, very often, a useful tool to confirm or refute a unilateral source of excess aldosterone secretion. It is technically difficult to perform and should be conducted only in centres with radiologist experienced in performing this technique.

## Therapeutic Drug Monitoring

**The drug assays available are:**

|  |  |  |
| --- | --- | --- |
| Carbamazepine sent to referral laboratory | Gentamicin | Digoxin |
| Phenobarbitone (sent to referral laboratory) | Vancomycin | Lithium |
| Phenytoin | Amikacin | Theophylline |
| Valproate |  |  |

**Sampling Times**

The blood samples MUST be taken at the correct time relative to the dose of drug. Samples taken at the wrong time are uninterpretable and misleading.

|  |  |
| --- | --- |
| Digoxin | 6-8 hours after last dose  **Note:** DIGIBIND interferes with digoxin measurement.  Thus, serum digoxin concentration measurement can be clinically misleading until DIGIBIND is eliminated from the body. Depending on the renal function, minimum of 5 days needs to be allowed prior to sampling for digoxin. |
| Carbamazepine | Immediately before oral dose |
| Phenobarbitone | Immediately before oral dose |
| Valproate | Immediately before oral dose |
| Phenytoin | Immediately before oral dose |
| Theophylline | Slow release preparations 8hrs post dose others before next dose  IV infusion at 6 & 18 hours |
| Lithium | 12 hours after last dose |
| Gentamicin | PRE: immediately before next dose  POST: 60 minutes after  Once a day dose – either 18 hrs. post or 6 hrs. pre-dose. |
|  |
| Vancomycin | PRE: immediately before next dose  POST 2 hours post dose |
| Amikacin | PRE: immediately before next dose  POST 2 hours post dose |

**Time taken for drug levels to reach steady state**

All drugs require a certain time after the initiation of the therapy to reach a **steady state**, and it is futile measuring drug levels before this (unless toxicity is suspected).

|  |  |
| --- | --- |
| Digoxin | 7 days |
| Carbamazepine | 2-4 weeks after initiation of therapy **or** 4 days after dose changes |
| Phenobarbitone | 3 weeks |
| Valproate | 2 days |
| Phenytoin | 7 – 10 days |
| Theophylline | 3 days in adults and (6 days in the neonates) |
| Lithium | 4 days |

**Therapeutic ranges**

Therapeutic ranges are only a guide. Some patients may be well controlled with serum concentrations below or above the therapeutic ranges given below.

|  |  |  |
| --- | --- | --- |
| **Analyte** | **Therapeutic Range** | **Toxic** |
| Digoxin 6hrs post dose | 0.8-2.0 µg/L | > 2.7 µg/L |
| Gentamicin Pre | <2 mg/L | > 3 mg/L (impaired excretion) |
| Gentamicin Post | 5-8 mg/L | > 10 mg/L |
| Lithium | 0.4- 0.8 mmol/L | > 1.2 mmol/L |
| Paracetamol 4 hrs. Post | 10-30 mg/L | Please refer to treatment chart |
| Phenobarbitone | 10 -40 mg/L | > 60 mg/L |
| Phenytoin | 10 - 20 mg/L | > 25 mg/L |
| Salicylate | 150 -300 mg/L | > 300 mg/L |
| Theophylline | 10 – 20 mg/L | > 25 mg/L |
| Valproate | 50-100 mg/L |  |
| Vancomycin Pre | 5-15 mg/L |  |
| Vancomycin Post | 8-26 mg/L |  |
| Amikacin Pre | <10 mg/L |  |
| Amikacin Post | 20-25 mg/L |  |

## Toxicology Drug Screening

**Assays available on site**

Salicylate

Paracetamol

Alcohol (clinical, not medico-legal). *Serum osmolality is offered on site and sample is referred out for alcohol after discussion with the requesting clinician.*

Carboxyhaemoglobin

**Interpretation**

Salicylate: Poisoning can produce profound metabolic disturbances

|  |  |
| --- | --- |
| Therapeutic range | 150 – 300 mg/L |
| Toxic levels: | > 300 mg/L |

Salicylate may be released from the tissues sometime after ingestion. Check the blood level after four hours if it is thought that toxic levels might be reached.

|  |  |  |
| --- | --- | --- |
| **Alcohol** | Toxic | See report |
|  | Lethal | See report |
|  |  |  |
| **Carboxyhaemoglobin:** |  |  |
| % of total haemoglobin | Suburban non-smokers | less than 1.5% |
|  | Smokers | 1.5 - 5.0 % |
|  | Heavy smokers | 5.0 - 9.0 % |
| **Paracetamol** | Therapeutic range | 10 – 30 mg/L |
|  | Treatment indicator | see nomogram |
|  |  |  |

In cases of Paracetamol overdose, treatment with N-acetyl cysteine is/is not indicated in accord with the nomogram which is available in casualty and the laboratory.

**Other drugs** It is not practical for the laboratory to screen for all poisons. Further treatment, advice and analytical services can be obtained by contacting the National Poisons Information Service (NPIS) 0844 8920111. The website for TOXBASE is [www.npis.org/toxbase.html](http://www.npis.org/toxbase.html).

**In all suspected overdose cases,** it should be a matter of routine for a sample of urine in a 30 ml white container, 10 ml clotted blood and gastric aspirate (where available) to be sent to the laboratory for storage (for four weeks) and possible later analysis.

## Paediatric Chemical Pathology

**Clinical Consultation**

The Consultant Chemical Pathologist/Clinical Scientist is available for the planning of investigations and interpretation of results. Testing children can be stressful for the child and the parents. Hence it is important to be economical with testing and getting it right the first time. Please contact Chemical Pathology **before** unusual testing.

**Minimum sample requirements**

The following volumes of plasma are required for the following tests.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Total plasma** | **comprising of** | |
|  | **volume** | **Analysis Vol.** | **Dead Vol** |
| **Sodium & Potassium** | **97 μl** | 47 μl | 50 μl |
| **Urea** | **60 μl** | 10 μl | 50 μl |
| **Creatinine** | **68 μl** | 18 μl | 50 μl |
| **Bilirubin** | **100 μl** | 50 μl | 50 μl |
| **Calcium** | **60 μl** | 10 μl | 50 μl |
| **Albumin** | **54 μl** | 04 μl | 50 μl |
| **AST** | **72 μl** | 22 μl | 50 μl |
| **Alk. Phos.** | **60 μl** | 10 μl | 50 μl |
| **Glucose** | **54 μl** | 04 μl | 50 μl |
| **Protein** | **58 μl** | 08 μl | 50 μl |

Any of the above will require a “dead volume” of 50 μl. **All the above will require 1ml of blood**. Please note that the PCV of a neonate is high.

**If a sample is insufficient please indicate priority. Otherwise a short profile (Na, K Urea, Ca, Alb, Glucose, ALT) will be assumed.**

**Reference Range**

If the date of birth is available on the request form, the age-related reference interval will be printed on the report form where appropriate.

## Investigation of Porphyrias

|  |  |  |
| --- | --- | --- |
| **Clinical Presentation** | **Specimens** | **Comments** |
| Acute neurological attacks  **(suspected AIP,VP, HCP or ADP)**  i.e. abdominal pain, vomiting,  neuropathy, psychiatric symptoms etc.) | Urine  Faeces  Blood | To exclude a current attack or to monitor patients with known porphyria, urine alone is adequate |
| Acute photosensitivity (suspected EPP) **i.e. erythema, pain, itching, oedema on direct exposure to sunlight, but without bullae and little or no scarring)** | Blood | **Urine and faeces of no value** |
| Skin lesions (suspected PCT, VP, HCP or CEP)  i.e. bullae, scarring, increased fragility, milia, pigmentation, hypertrichosis etc. | Urine  Faeces  Blood | Provided the disease is currently active blood alone is adequate. To monitor patients with PCT send urine only. For anuric patients in which **pseudoporphyria** is suspected send plasma and faeces. |
| Family studies | Please enquire | Diagnostic approach depends on type of porphyria. Accurate diagnosis of the proband is essential. |

Key:

**AIP**: acute intermittent porphyria **VP:** variegate porphyria

**HCP:** hereditary coproporphyria **PCT:** porphyria cutanea tarda

**EPP:** eythropoietic protoporphyria **CEP:** congenital erythropoietic porphyria

**ADP:** ALA-dehydratase porphyria

(plumboporphyria)

If in doubt please send urine, faeces and blood.

All samples should be protected from light. Very dilute urine specimens are unsuitable for analysis so an early morning urine sample is preferred. A 24-hour urine collection offers little advantage.

## Phoning critical results

Clinically significant abnormal results are telephoned promptly to the requesting clinician/duty doctor as shown in the table below.

Where the abnormal result is longstanding eg a persistently raised urea in a known renal failure patient it is not telephoned. **The exception is for sodium, potassium, low glucose, Digoxin, Theophylline and Lithium where high results exceeding these limits are always phoned.**

| **Test** | **Units** | **A/E** | **Wards** | **GP/OPD**  **(Critical All Hours)** | **GP Results**  **Mon-Thurs \*** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| **ALT** | U/L | N/A | ≥ 500 | ≥ 500 | ≥ 350 but < 500 |  |
| **Ammonia** | µmol/L | N/A | ≥ 100 | ≥ 100 | N/A |  |
| **Amylase** | U/L | ≥ 600 | ≥ 600 | ≥ 600 | ≥ 300 but < 600 |  |
| **Bile Acids** | µmol/L | N/A | ≥ 16 | ≥ 50 | ≥ 25 but < 50 | For pregnant women only |
| **Adjusted Calcium** | mmol/L | ≤ 1.8 or ≥ 3.5 | ≤ 1.8 or ≥ 3.5 | ≤1.8 or ≥3.5 | ≥ 3.0 but < 3.5 |  |
| **Cortisol** | nmol/L | ≤ 100 | ≤ 100 | ≤ 100 | N/A | Unless post-dexamethasone suppression |
| **Creatine Kinase** | U/L | N/A | ≥ 1000 | ≥ 2000  ≥ 500 if MI? | ≥ 500 but < 2000 |  |
| **Creatinine (adult)** | µmol/L | ≥ 500 | ≥ 354 | ≥ 354 | N/A |  |
| **Creatinine (paediatric)** | µmol/L | ≥ 500 | ≥ 354 | ≥ 200 | N/A |  |
| **CRP** | mg/L | N/A | ≥ 300 | ≥ 100 | ≥ 100 |  |
| **Digoxin** | µg/L | N/A | ≥ 2.5 | ≥ 2.5 | ≥ 2.5 |  |
| **Gentamicin**  Pre-dose | mg/L | N/A | ≥ 2 | ≥ 2 | N/A |  |
| **Glucose (adult)** | mmol/L | ≤ 2 or ≥ 30 | ≤ 2.5 or ≥ 25 | ≤ 2.5 or ≥ 25 | ≥ 20 but < 25 |  |
| **Glucose (paediatric)** | mmol/L | ≤ 2 or ≥ 15 | ≤ 2 or ≥ 15 | ≤ 2 or ≥ 15 | N/A |  |
| **Lactate** | mmol/L | N/A | ≥ 4.0 | ≥ 4.0 | ≥ 3 but < 4 |  |
| **Lithium** | mmol/L | N/A | ≥ 1.5 | ≥ 1.5 | N/A |  |
| **Magnesium** | mmol/L | ≤ 0.4 | ≤ 0.4 | ≤ 0.4 | N/A |  |
| **Paracetamol** | mg/L | ≥ 30 | ≥ 30 | ≥ 30 | N/A |  |
| **Phenytoin** | mg/L | N/A | ≥ 25 | ≥ 25 | N/A |  |
| **Phosphate** | mmol/L | ≤ 0.3 | ≤ 0.3 | ≤ 0.3 | N/A |  |
| **Potassium** | mmol/L | ≤2.5 or ≥ 6.5 | ≤ 2.5 or ≥ 6.5 | ≤ 2.5 or ≥ 6.0 | N/A |  |
| **Salicylate** | mg/L | ≥ 300 | ≥ 300 | ≥ 300 | N/A |  |
| **Sodium (adult)** | mmol/L | ≤ 120 or ≥ 150 | ≤ 120 or ≥ 150 | ≤ 120 or ≥ 150 | N/A |  |
| **Sodium (paediatric)** | mmol/L | ≤ 130 or ≥ 150 | ≤ 130 or ≥ 150 | ≤ 130 or ≥ 150 | N/A |  |
| **Theophylline** | mg/L | N/A | ≥ 25 | ≥ 25 | N/A |  |
| **Total Bilirubin** | umol/L | ≥ 360 | ≥ 360 | ≥ 360 | N/A |  |
| *Conjugated Bilirubin* | *umol/L* | *≥ 250* | *≥ 250* | *≥ 250* | N/A |  |
| **Triglycerides** | mmol/L | N/A | ≥ 20 | ≥20 | ≥ 15 but < 20 |  |
| **hs Troponin I** | ng/L | ≥ 259 | ≥ 259 | Females  ≥ 15ng/L  Males ≥ 34ng/L | N/A |  |
| **Urea (adult)** | mmol/L | ≥ 30 | ≥ 30 | ≥ 30 | N/A |  |
| **Urea (paediatric)** | mmol/L | ≥ 10 | ≥ 10 | ≥ 10 | N/A |  |

\*If results for GP patients are generated between these ranges out of hours, they will be telephoned on the next working day. This only applies Monday – Thursday.

# Immunology

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[Clinical advice 151](#_Toc169096621)

[Immunology Testing Request Guide 151](#_Toc169096622)

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[**ANA 153**](#_Toc169096625)

[**Other Tissue Antibodies 154**](#_Toc169096626)

**Immunology**

Separate samples should be sent for immunology testing.

## Clinical advice

To discuss results please contact the Immunology Clinical Scientist or the Consultant Immunologist. The Clinical Scientist can be contacted on 02073077373 ext 3215/3217. The Consultant Immunologist, Dr Scott Pereira can be contacted on 07798 914 734.

The following table serves as a guide as to which test(s) to request for particular possible diagnosis (test shown in brackets may additionally be indicated in some circumstances).

## Immunology Testing Request Guide

|  |  |
| --- | --- |
| **Possible Diagnosis** | **Test(S) to be Requested** |
| Chronic Active Hepatitis | ANA (Ig’s) |
| Connective Tissue Disease | ANA (see individual disorders) |
| Glomerulonephritis | ANCA, GBM, ANA, (DNA) C3, C4 |
| Goodpastures Syndrome | GBM (ANCA) |
| Graves’ disease / Goitre / Hypothyroidism | TPO |
| Juvenile chronic arthritis | CCP, ANA, (ENA, DNA) |
| Mixed connective tissue disease (MCTD) | ANA, CCP, (ENA, DNA) |
| Myocarditis/Pericarditis/Dressler's syn | Cardiac muscle antibodies |
| Pemphigoid/Pemphigus | PEM antibodies |
| Polymyositis/dermatomyositis | ANA, ENA |
| Primary biliary cirrhosis (PBC) | OTA (Ig's) |
| Rheumatoid arthritis | CCP, (ANA) |
| Sjogren's syndrome | ANA, CCP, ENA, (Ig's) |
| Systemic lupus erythematous (SLE) | ANA, ENA, DNA, C3, C4 |
| Systemic sclerosis | ANA, ENA, |
| Vasculitis | ANA, ENA, ANCA, (CCP, C3, C4) |
| Wegener's granulomatosis | ANCA, |
| CVA | ACA, ANA |

Sample Type for tests: Yellow top. Plain bottle (contains separating gel)

Sample Volume: 1x 4ml sample

## Immunology Test Repertoire

HSL samples are sent to: Immunology Dept, HSL Laboratories, The Halo Building, 1 Mabledon Place, London, WC1H 9AX, Telephone: 02073077373

| **TEST NAME** | **Specimen type** | **Sample volume** | **TAT of referral laboratory** |
| --- | --- | --- | --- |
| Adrenal antibodies | BY | 1x4ml | HSL - 5 working days |
| ANCA | BY | 1x4ml | HSL - 5 working days |
| Antinuclear factor antibody (ANA) | BY | 1x4ml | In house - 5 working days  (If sent for confirmation to HSL for confirmation: additional 5 working days) |
| Anti-cardiolipin antibodies (ACL) | BY | 1x4ml | HSL - 5 working days |
| CCP antibodies | BY | 1x4ml | HSL - 5 working days |
| DNA antibodies | BY | 1x4ml | HSL - 5 working days |
| ENA antibodies | BY | 1x4ml | HSL - 5 working days |
| GAD antibodies | BY | 1x4ml | HSL - 7 working days |
| Gastric parietal cell antibodies (GPC) | BY | 1x4ml | HSL - 7 working days |
| glomerular basement membrane antibodies (GBM) | BY | 1x4ml | HSL - 7 working days |
| GM1 ganglioside antibodies | BY | 1x4ml | HSL - 2-3 Weeks |
| Intrinsic factor antibodies | BY | 1x4ml | HSL - 7 working days |
| Islet cell antibodies | BY | 1x4ml | HSL - 7 working days |
| Liver-kidney-microsomal antibodies (LKM) | BY | 1x4ml | HSL - 7 working days |
| M2 antibodies | BY | 1x4ml | HSL - 7 working days |
| Mitochondrial antibodies  (AMA) | BY | 1x4ml | HSL - 7 working days |
| Anti mullerian hormone (amull) | BY | 1x4ml | HSL - 7 working days |
| Neuronal antibodies  (HU, YO) | BY | 1x4ml | HSL - 7 working days |
| Ovarian antibodies | BY | 1x4ml | HSL - 7 working days |
| Pemphigus/pemphigoid antibodies | BY | 1x4ml | HSL - 7 working days |
| Phospholipid antibodies | BY | 1x4ml | HSL - 7 working days |
| Purkinje cell antibodies  (YO) | BY | 1x4ml | HSL - 7 working days |
| Reticulin antibodies polyvalent | BY | 1x4ml | HSL - 10 working days |
| Sc1170, SS-A(RO) SS-A (LA),Jo1 | BY | 1x4ml | HSL -7 working days |
| Tissue transglutaminase (TTG) | BY | 1x4ml | In house: 5 Working Days  (If sent for confirmation to HSL: additional 5 days) |

## Guide to the Interpretation of Autoimmune Disease Investigations

The information contained in this section represents only the most commonly requested tests or IF patterns encountered/reported. It is not intended to be a comprehensive review of all available tests, IF patterns or clinical associations. If you require further information please contact the department.

### ANA

Antinuclear antibodies (ANA) are requested when there is a clinical suspicion of connective tissue disease or autoimmune liver disease.

For suspicion of connective tissue disease, a CTD assay should be requested. This assay will screen for the presence of autoantibodies to the following antigens; SSA (Ro 52 and Ro60), SSB (La), U1-RNP, Sm, Scl-70, Jo1, Centromere B, the other main clinical reasons for requesting an ANA screen is when there is a suspicion of autoimmune liver disease. In this situation HEP2 and tissue auto-antibodies should be requested. With this test an ANA by IIF on the HEP2 and tissue block will be performed which will enable us to also test for other liver disease associated with antibodies such as smooth muscle and LKM antibodies and nuclear dots on HEP2 at the same time. It is therefore important to indicate under clinical details that there is a possibility of liver disease.

**Suggested follow up testing for positive ANA results by Elisa (CTD screen)**

The Phadia ANA result will be reported as a Ratio. Reference Range :

Negative : <0.7

Equivocal : 0.7 to 1.0

Low Positive : 1.0 to 4.0

Moderate Positive : 4.0 to 10.0

Strong Positive : >10.0

DNA and ENA antibodies may be added to the request depending on the clinical information supplied and the results of other relevant investigations.

**Negative ANA [by CTD assay] virtually excludes active SLE.**

If ANA (CTD Screen) is negative, DNA and ENA antibodies are not usually indicated.

**Advice for repeating testing**

If clinical suspicion of CTD or autoimmune liver disease remain it is reasonable to repeat all initial screening tests on a second occasion to confirm the result, however as antibodies are cleared from the blood over several weeks, repeating too soon will not provide useful clinical information. **Once confirmed most autoantibody tests do no need to be repeated unless there is a change in clinical features.**

**The following are the recommended minimum times between repeats:**

DNA, ANCA 4 weeks

CCP antibodies 12 months maximum (not usually necessary to repeat)

ANA and ENA antibodies 12 months

Liver autoantibodies 12 months

Cardiolipin/antiphospholipid Abs 3 months to confirm persistence (limited value once diagnosis has been confirmed)

**The exceptions are:**

1. DNA is a useful monitor of disease activity in known SLE patients.

2. ANCA can be useful in monitoring disease activity in Granulomatosis with Polyangiitis (formerly Wegener’s granulomatosis), however rising ANA levels may also occur in infection. In most other vasculitides ANCA does not reflect disease activity and repeated testing is not indicated.

This is not a prescriptive list and new symptoms or worsening of the clinical picture in diseases which are still evolving may require repeating in under the recommended times.

### **Other Tissue Antibodies**

Low titre antibodies may be found in normal people, relatives of patients with autoimmune conditions and a variety of diseases, without an autoimmune basis, such as inflammation and cancer. The prevalence of these antibodies also increases with age. In general high titres of greater than 1/80 are often significant disease indicators but low or absent titres do not exclude disease.

Below are listed the most common reported antibodies and their main clinical association:

#### **Gastric Parietal cells**

Pernicious anaemia, & Thyroid disease

#### **Mitochondria**

Primary biliary cirrhosis, autoimmune thyroiditis and Sjogren’s syndrome

#### **Smooth Muscle**

Autoimmune hepatitis, viral infections, SLE and RA

#### Liver / Kidney / microsomes

Autoimmune and drug induced hepatitis; Infections.

#### Antibodies to double stranded DNA

**Reference range:** < 10 IU/ml

Elevated levels are specific for active SLE but also occur in lupoid chronic active hepatitis.

#### ENA antibodies

These antibodies recognise saline extractable cellular antigens.

Eight specificities are routinely tested for:

#### Anti Ro (SSa)

Associated with Sjogren’s, SLE, cutaneous lupus, neonatal lupus and congenital complete heart block.

#### Anti La (SSb)

Associated with Sjogren’s, SLE and neonatal lupus.

#### Anti Sm

Specific for SLE found in approximately 25 – 40% of patients but are reported to be seen most frequently in West Indians with SLE and are relatively rare in Caucasians.

#### Anti RNP

Associated with SLE and when occurring alone with MCTD.

#### Anti RNP 70

Associated with Mixed Connective Tissue Disease

#### Anti Scl-70

Found in 20 – 40% patients with progressive systemic sclerosis (PSS) and 20% of patients with limited sclerosis.

#### Anti Jo-1

Associated with polymyositis, pulmonary fibrosis and dermatomyositis.

#### Centromere

Associated with the CREST syndrome.

#### Thyroid peroxidase antibodies (TPO)

Reference range: 0-34 IU/mL

These antibodies are found at high levels in up to 90% of patients with autoimmune thyroid disease e.g. Hashimoto’s thyroiditis and Graves’ disease.

They may also be found in low titre in patients with thyroid carcinoma and occasionally inthe ‘normal’ population.

In addition, they may also be found in patients with other organ-specific autoimmune diseases such as pernicious anaemia and Addison’s disease.

#### Cyclic Citrullinated Protein Antibodies (CCP/MCV Abs)

Reference range:

Normal <7 U/ml

Equivocal 7 – 10 U/ml

Positive >10.0 U/ml

This test has replaced the RhF test. It has a similar sensitivity to the RF test but with a higher specificity (97%) for Rheumatoid Arthritis.

#### Anticardiolipin (phospholipid) antibodies.

Reference ranges:

IgG antibodies (GPL – U/ml) Normal <10

Equivocal 10 – 40

Positive >40

IgM antibodies (MPL – U/ml) Normal <10

Equivocal 10-40

Positive >40

Antiphospholipid antibodies are associated with a variety of conditions including SLE, the antiphospholipid syndrome (venous & arterial thrombosis, stroke, TIA, and multiple–infarct dementia, in the absence of other features of lupus), thrombocytopenia and recurrent foetal loss.

The level of the antibody in units does not seem to directly relate to the severity of the disease. However weak positive results are of doubtful significance.

Transient positive antibodies may be found after viral infections. It is therefore very important to send a repeat sample, with a gap of 3 months, for a diagnosis of the antiphospholipid syndrome, and to check for the presence of a Lupus Anticoagulant (5 ml citrate to haematology, if the patient is not anticoagulated).

#### Coeliac Disease Screening - Tissue Transglutaminase (tTg) IgA antibodies

Clinical comments:

o   TTG IgA negative 0.2  to 10 U/ml      Coeliac disease unlikely. (please note that if the patient has no dietary gluten, results may appear false negative).

o   TTG IgA positive >/= 10 U/ml             Suggestive of Coeliac disease (Confirmatory from the referral Laboratory)

o   TTG IgA <0.2, total IgA >0.07g/L        Coeliac disease unlikely. (please note that if the patient has no dietary gluten, results may appear false negative).

o   TTG IgA <0.2, total IgA<0.07g/L, deamidated gliadin IgG negative    Coeliac disease unlikely (please note that if the patient has no dietary gluten, results may appear false negative).

o   TTG IgA <0.2, total IgA <0.07 g/L, deamidated gliadin IgG positive    Consistent with coeliac disease in a patient with selective IgA deficiency.

#### Complement C3 & C4 Assays

Reference ranges

C3 - 0.79 – 1.52 g/L (Please note these are reference lab ranges)

C4 - 0.18 – 0.55 g/L (Please note these are reference lab ranges)

**High C3 and /or C4**

Not usually significant. Suggestive of acute phase response.

**Low C4, normal C3**

Genetic deficiency

Active SLE, Cryoglobulinaemia, C1-esterase inhibitor deficiency.

**Low C3, normal C4**

Post streptococcal glomerulonephritis, membranoproliferative glomerulonephritis type 2 (associated with C3 nephritic factor), viper bite, SBE

**Low C3 and C4**

Sepsis, Active SLE

#### CH100 & AP100 Assays

Indicated only in suspected primary complement deficiency. (Patients with recurrent invasive neisserial infection or siblings of patients with primary complement deficiency).

These tests are no longer routinely available. Please discuss with Dr Scott Pereira 07798914734

#### C1 inhibitor

C1 inhibitor is used in testing for hereditary or acquired angioedema associated with C1 inhibitor deficiency. Patients have recurrent angioedema, abdominal pain and cutaneous swellings without urticaria. C4 is almost always low, even between attacks.

#### ANCA (Anti neutrophil cytoplasmic abs)

Renal disease, lung fibrosis, neuropathy, vasculitis, i.e., Granulomatosis with Polyangiitis (formerly Wegener’s Granulomatosis), Microscopic Polyangiitis and Eosinophilic Granulomatosis with Polyangiitis (formerly Churg Strauss Syndrome). Please note that ANCA is occasionally used to differentiate between Crohn’s and ulcerative colitis but no a recommended test.

# ANNEX 1: Haematology Reference Range Limits and Source

Due to physiological variations reference ranges in Haematology are age and sex specific and therefore several reference ranges are available for a number of measured parameters

Refer to attached spreadsheet for reference range limit and below table for the source.



All results within the validation limits are auto validated by the Laboratory Information Management System LIMS). Results outside the validation limits are held in a queue for BMS validation

| **TEST** | **SOURCE OF REFERENCE LIMITS** |
| --- | --- |
| Antithrombin | Manufacturers (IL) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1. |
| Anti-Xa | Derived from published literature –manufacturer of Enoxaparin (Sanofi) and ACCP Guidelines 2012: Peak levels 0.6-1.0 iu/ml for 1mg/kg bd dosing. 1-2iu/ml for 1.5mg/kg od dosing. |
| APCR | Locally derived Reference Range. |
| APTT | Locally derived from >100 normal (Synthsil Batch specific) +/- 2SD’s |
| D-Dimer | Manufacturers (IL) cut off of 500 ng/mL for exclusion of VTE . Kit insert. |
| DRVVT | Manufacturer: (IL) in house study of 120 normals. Normalised ratio cut off derived from mean of 40 normals (>1.2). Kit insert |
| Erythrocyte sedimentation rate (ESR) | S Mitchell Lewis, Barbara J Bain &Imelda Bates ( 2001)  9th edition Dacie and Lewis ( Practical Haematology) |
| Fibrinogen | Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1. |
| Factor VIII | Manufacturers (IL) range. Kit insert. |
| Factor IX | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor XI | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor XII | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor XIII | Manufacturers (IL) range. Kit insert.  Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor II | Manufacturers (IL) range. Kit insert  Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor V | Manufacturers (IL) range. Kit insert  Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor VII | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Factor X | Manufacturers (IL) range. Kit insert.  Optimising Paediatric Haemostasis Testing Rev 1 for < 17 years. |
| Full blood count | S Mitchell Lewis,Barbara J Bain &Imelda Bates ( 2001)  9th edition Dacie and Lewis ( Practical Haematology) |
| Haemaglobinopathy screen (HBOP) | Manufacturer’s Kit Insert. Sickle cell and Thalassaemia Handbook. NHS screening programme. 3Rd edition October 2012 |
| Infectious mononucleosis screen (IMS) | Manufacturers Kit insert Accusay Mono kit insert. |
| Malaria screen - Thick and Thin film for microscopy | Laboratory Diagnosis of Malaria, BCSH Guideline (2013) |
| Malaria screening | Manufacturers Kit insert BinaxNOW |
| Peripheral Blood film microscopy | ICSH recommendations for the standardization of nomenclature and grading of peripheral blood cell morphological features. August 2014 |
| Peripheral Bone Marrow microscopy | ICSH guidelines for the standardization of bone marrow specimens and reports. 2008 |
| Protein C | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 |
| Protein S | Manufacturers (IL) range. Manufacturer: (IL ) range. Kit insert and IL Optimising Paediatric Haemostasis Testing Rev 1 |
| Prothrombin Time | Locally derived from >100 normals (Recombiplastin Batch specific) +/- 2SD’s. |
| Sickle cell screen | Manufacturers Kit insert .Sickledex Solubility test kit. |
| Thrombin Time | Manufacturers (IL) range. Kit insert |
| Von Willebrand Antigen / RiCof assay | Manufacturers (IL) range. Kit insert. |

# ANNEX 2: Blood Sciences Sample and Analyte Stability







# ANNEX 3: COAGULATION SUMMARY TABLE FOR SAMPLE REJECTION CRITERIA AND REASONS

|  |  |
| --- | --- |
| **Sample rejection** | **Impact** |
| Underfilled | Under-filling increases the dilution of the sample due to the volume of liquid anticoagulant, and may increase the clotting time due to the excess calcium-binding citrate present |
| Overfilled | Over-filling decreases the dilution of the sample due to the volume of liquid anticoagulant, and may decrease the clotting time due to the excess of plasma present |
| Haemolysed | Haemolysis can affect some coagulation tests because of the presence of thormoboplastic substances or presence of haemoglobin pigment with photo-optical systems.    The aPTT can be falsely prolonged or shortened and AT and fibrinogen decreased by in vitro haemolysis.    Haemolysis may lead to statistically significant increases in PT and D-dimer. |
| Clotted | Clotted samples may cause consumption of clotting factors therefore will have low levels of fibrinogen level. |
| Lipaemia/Icterus | Gross Icterus and lipaemia may affect analysis with optical absorbance or impeding light transmittance. |
| Patient ID mismatch/Incorrect | Incorrect sample and **mismatched patient** ID can lead to **patients** getting the wrong results or treatment, delayed treatment, or missed follow up. |
| Incorrect sample tube |
| Leaking sample | This would pose a health and safety risk to those handling them |