PATHOLOGY

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University Hospitals of Leicester NHS Trust

Blood Sciences User Handbook

A user guide for UHL Blood Sciences Pathology services

Contents

Foreword

Dear Colleague,

This handbook has been prepared by the Blood Sciences Department of University Hospitals of Leicester NHS trust. It combines information from previous handbooks of each component laboratory and is intended to provide essential information about the range of services available and how best to access these, including test repertoire, specimen requirements and laboratory contact details.

According to quality standards, each request accepted by our laboratories represents a formal agreement and as such must meet both local quality policies (available on UHL Connect or on request) and national accreditation (UKAS/MHRA) requirements. Only examinations in which our staff have a suitable degree of skill and knowledge will be processed by our service. Other tests may be offered but samples may be sent to external referral laboratories for analysis.

All Blood Sciences UKAS accredited tests can be found on our schedule of accreditation using this link: https://www.ukas.com/find-an-organisation/ and our accreditation number 8376

Any views that users have about how our service can be improved would be welcome as this will ensure we are providing tests relevant to a changing healthcare environment. Feedback about how this guide could be improved would also be welcome for incorporation into future editions. Please send your comments to the Blood Sciences Quality Team via Yusuf Sidat (Quality Manager) by email: yusuf.sidat@nhs.net .

1. Introduction

The Blood Sciences Department at University Hospitals of Leicester (UHL) is a part of the Clinical Support and Imaging directorate. The Department is an amalgamation of 5 component specialisms; General Haematology & Chemistry, Special Haematology, Special Chemistry, Blood Transfusion and Immunology.

The department provides a high quality, effective service to hospital patients, GP surgeries and community practitioners, as well as acting as a referral centre for certain analyses. To maintain the quality of our service we are dependent upon you, the user, to provide specimens appropriate for investigation. Please take note of the guidance provided in this handbook. If any doubt exists, please contact the relevant laboratory where staff will be happy to assist you.

2. Location of Blood Sciences Laboratories

The Blood Sciences Laboratories are located across all three UHL Trust sites with the main laboratories at the Leicester Royal Infirmary (LRI). There are satellite laboratories in A&E at LRI, and at Leicester General Hospital (LGH) and Glenfield Hospital (GH) sites. Map locations of the three hospital sites can be found in Appendix 1.

Hospital	Service	Postal Address
LRI	General Chemistry and Haematology (Fast Track laboratory)	Level 4, Sandringham Building Leicester Royal Infirmary Leicester LE1 5WW
	Special Chemistry	
	Blood Transfusion	Level 2, Sandringham Building Leicester Royal Infirmary Leicester LE1 5WW
	Special Haematology	
	Immunology	Level 1, Hearing Services Building Leicester Royal Infirmary Leicester LE1 5WW
	General Chemistry and Haematology	Department of Accident and Emergency

Hospital	Service	Postal Address
		Leicester Royal Infirmary Leicester LE1 5WW
GH	General Chemistry and Haematology	Department of Pathology Glenfield Hospital Groby Road Leicester LE3 9QP
	Blood Transfusion	
LGH	General Chemistry and Haematology	Department of Pathology Leicester General Hospital Gwendolen Road Leicester LE5 4PW
	Blood Transfusion	

3. Scope of Blood Sciences Laboratories

Within the Department of Blood Sciences, there is a range of laboratory services covering both general and specialist tests, which are described below. The Blood Science Department has a commitment to meeting the needs of our users and patients.

Blood Transfusion

The Department of Transfusion Medicine provides a comprehensive range of blood transfusion services and has laboratories at all three UHL sites. Pre-transfusion testing and issue of blood products is available from all three laboratories. More specialist testing including Kleihauer testing for estimation of fetal maternal haemorrhage is offered from the main LRI laboratory. For specialist requests outside our available range of tests, samples are referred to an accredited reference laboratory for analysis.

Fast Track (General Biochemistry and Haematology)

"Fast Track" is the largest laboratory within Blood Sciences and processes more than 12,000 samples a day. It provides a comprehensive service to hospital and community clinicians, covering both general haematology and chemistry investigations.

The Haematology service consists of both cellular haematology and coagulation screening, as well as blood film morphology and malaria parasite investigations/speciation. General Biochemistry provides an extensive repertoire of general investigations, including liver and kidney function testing, electrolyte monitoring and quantification of numerous analytes.

Immunology

The Immunology laboratory offers a comprehensive service covering all aspects of allergy, autoimmunity, immunochemistry, immunodeficiency, and leukaemia and lymphoma immunophenotyping.

Special Chemistry

The Special Chemistry laboratory offers a service to primary care, UHL and other healthcare providers. The laboratory test repertoire covers automated, semi-automated and manual assays, with a special interest in chromatography. Two of its specialist testing services are recognised internationally – Toxicology and National Centre for Drug Adherence Testing (NCAT).

Toxicology

The Toxicology laboratory provides clinical and post-mortem toxicology services to HM Coroners, Home Office Pathologists, Consultant Histopathologists, police forces and other external laboratories. Please note that the Toxicology Unit has a separate handbook (available upon request) so information on post-mortem services is not included in this document.

National Centre for Drug Adherence Testing (NCAT)

UHL has developed world leading expertise in the measurement of prescribed medications in the urine as a measure of adherence screening for the presence of over 60 drugs and their metabolites.

Special Haemostasis

The laboratory provides a full haemostatic/thrombotic diagnostic service including diagnosis of bleeding disorders, thrombophilia investigations, Platelet Function Testing for Heritable Platelet Disorders (HPD) and anticoagulant monitoring.

Haemoglobinopathies

The Haemoglobinopathy laboratory at UHL provides a full diagnostic service for patients with suspected abnormalities of haemoglobin production (known as haemoglobinopathies or haemoglobin disorders). The laboratory participates in the national antenatal screening programmes. Additional tests for enzyme disorders (e.g. G6PD deficiency) and some specialised tests of red cell function are also available.

Haematological Malignancy Diagnostic Links (HMDL)

HMDL co-ordinates the testing of bone marrow, CSF and other liquid samples (e.g. pleural fluid) when a haematological malignancy is suspected or to monitor response to treatment. The laboratory produced integrated reports for all samples which contain all information recorded on the sample. This includes morphology (which is reported by HMDL) along with additional diagnostic information produced by accredited laboratories (I.e. Immunology and Cytogenetics).

Molecular Diagnostics

The Special Haematology Molecular Diagnostic Service provides additional support to the Haemostasis and Thrombosis clinic, the HMDL service and the Haemoglobinopathy service. The laboratory works with external, accredited laboratories to provide an extensive range of molecular investigations.

4. Opening Hours

Laboratory Service	Routine Working Hours	Out of Hours
Fast Track Chemistry and Haematology (LRI/LGH/GH)	24 hours 7 days a week	
Blood Transfusion (LRI/LGH/GH)	24 hours 7 days a week	
Special Chemistry	Monday – Friday 9.00am – 8.00pm	On-call laboratory service specifically for Xanthochromia. Assay only available after discussion with the on call Consultant Chemical Pathologist/Clinical Scientist
Special Haematology	Monday-Friday 8.00am – 8.00 pm	On-call service available after discussion with the Specialist Trainee for Haematology. (Contact via the UHL switchboard).
Immunology	Monday-Friday 7.30am – 7.00 pm	Immunology currently do not offer an out of hours service

Clinical Advice and Results Interpretation

In the event that advice regarding testing strategies or interpretation of results is required, dedicated senior laboratory and clinical staff are available 24 hours a day.

Haematology (General and Specialist) and Blood Transfusion

A Haematology Specialist Trainee and Consultant Haematologist are available 24/7, and can be contacted via switch board.

Biochemistry (General and Specialist)

09:00-17:00 Mon to Fri (excluding bank holidays), please contact the Duty Biochemist (0116 258 6560). Out of hours there is an on-call Consultant Chemical Pathologist / Clinical Scientist available for advice who can be contacted via switchboard

Immunology

08:00-18:00 Mon to Fri, please contact either an Immunology Consultant or a Specialist Trainee via switchboard to discuss results interpretation, management or to arrange a ward consultation. Clinical Scientists and senior Biomedical Scientists can be contacted (0116 258 6710) to discuss result interpretation and requesting of laboratory requests.

5. Laboratory and Staff Contact Details

Laboratory Contact Details

General Contacts	Contact Number
Duty Biochemist	0116 258 6560/6551
Results and Enquiries: Fast Track	0116 258 6531/7999
Results and Enquiries: Immunology	0116 258 6710
Add-on tests (GP)	0116 258 6531
Blood Transfusion – LRI	0115 258 6605/6606/6608 Bleep: 4703*
Blood Transfusion – LGH	0116 258 4564 Bleep: 3383*
Blood Transfusion - GH	0116 256 3577 Bleep: 2588*
General Biochemistry – LRI	0116 258 6565/6551
General Haematology - LRI	0116 258 6525
General Haematology and Biochemistry – LRI A&E	0116 258 0144/0147
General Biochemistry – LGH	0116 258 4558
General Haematology - LGH	0116 258 4566
General Biochemistry - GH	0116 256 3572
General Haematology - GH	0116 256 3575
Special Chemistry – Functional Automation Lab	0116 258 6561
Special Chemistry – Chromatography Lab	0116 258 6555
Special Chemistry - Toxicology Lab	0116 258 6556
Special Haemostasis	0116 258 6619
Haemoglobinopathy	0116 258 7531
HMDL Service	0116 258 6518
Immunology - Autoimmunity, Allergy and Immunochemistry	0116 258 6709
Immunology - Immunodeficiency and Flow Cytometry	0116 258 6713
Pathology Duty Manager	07961 729901
The Blood Transfusion laboratory must be phoned or bleeped for all urgent requests. **Activation of Major Haemorrhage Protocol via bleep** **AT ALL TIMES**	

Key Staff

Heads of Service

Name	Role	Direct Line	Secretary
Dr Linda Barton	Deputy Clinical Director for CSI Head of Service for Haematology Consultant Haematologist	0116 258 6518	0116 258 6614
Dr Paul Smith	Interim Head of Service for Chemical Pathology Consultant Clinical Scientist	0116 258 5772	
Dr Hafiz Qureshi	Head of Service for Blood Transfusion Service Clinical Lead for Pathology Clinical Lead for Blood Sciences Consultant Haematologist	0116 256 6612 Air Pager: 07699 613428	
Dr Sai Duraisingham	Head of Service for Laboratory Immunology, Consultant Clinical Scientist	0116 258 6705	
Dr Shanti Mahabir	Head of Service for clinical Immunology, Consultant Immunologist		

Service Managers

Name	Role	Contact Number
Jilean Bowskill	Pathology General Manager	0116 258 6532
Hafiz Arif	Blood Sciences General Manager:	0116 258 6574
Fay Sharman	Deputy Service Manager Immunology	0116 258 6709
Janine Rolland	Deputy Service Manager: General & Special Haematology & HMDL	0116 258 6574
Amardeep Ghattaoraya	Deputy Service Manager: Blood Transfusion	0116 258 6604
Anas Ghivalla	Deputy Service Manager: Blood Transfusion	0116 258 6604
Yusuf Sidat	Quality Manager	0116 258 3211
Marie Browett	Lead Transfusion Practitioner	0116 258 7876

6. Request Forms

Private Patients

Requests on private patients must be clearly labelled as such. A fee is payable for these tests - a list of charges is available on request.

General Guidance

It is the responsibility of the requesting clinician to ensure that request forms are completed to the agreed standard.

Where possible, pathology requests should be made electronically via Nervecentre for wards and ICE for GP patients. This offers numerous advantages over completion of handwritten requests, including:

- No rejected forms due to inaccurate information

- No transcription errors when filling in forms
- No missed tests
- Ensures all mandatory fields are completed

Outpatient Clinic Pathology requests may still be made using hand written request forms until electronic requesting is available across the whole Trust.

When ICE is down, and requests cannot be made electronically, GP's are advised to use handwritten request forms and hand written blood tubes. The sample acceptance criteria remains the same with the sample being labelled with a minimum of 3 identifiers from

i. NHS/S Number

ii. Patient's full name (surname and forename initial not acceptable), or unique coded identifier

iii. Date of birth

Filling out a handwritten request form

The correct forms must be used when making a request (see appendix 3). The form must be completed in FULL with ball point pen in BLOCK CAPITAL LETTERS. Addressograph labels may also be used. Please ensure that the destination and requesting consultant/GP are given. Failure to do so will result in a significant delay in patients receiving their results. The hospital S number should be used when known. If the patient falls into 'High Risk' category, this must be indicated on the form, as well as sample urgency.

All forms should be signed and dated (and the collection time recorded for time critical tests) by the person collecting the sample. For ICE/Nervecentre requests this is automatically recorded during the process. For hand written forms, the person collecting the sample must sign and date the form (and indicate collection time) *even if there is no printed prompt to do so*. Please add signature and date into the large 'Clinical Details' box.

Compulsory Patient Information which **must** be completed on the request form by requestor:

i. NHS/CHI or S number (if allocated)
ii. Patient's full name or unique coded identifier
iii. Date of birth – indicate if unknown
iv. Gender
v. Location for the report to be sent (plus full details of additional copies)
vi. Requesting clinician (full name)
vii. Investigations required*
viii. Priority status – if urgent
ix. Clinical details (reason for the request and any underlying condition which may affect result interpretation or advice)
x. Date and time of specimen collection
xi. Patient's address, including postcode
xii. Practitioner's contact number (bleep or extension) is desirable.

*When hand written forms have to be used then non-tick test requests should be added in the 'Other Tests' area of the form. The 'Clinical Details' area must not be used to request tests.

Non numerical/alphabetical characters should **not** be used in the S or NHS number (e.g. S-1234567). While this does not alter sample validity, it may slow sample processing and must be avoided.

For Antenatal Haemoglobinopathy screening the information for family origin must be completed for both mother and biological father and gestation information must be completed.

Kleihauer Testing

Gold 'Kleihauer' request forms (please see appendix 3) are required for feto-maternal bleed estimation and anti-D immunoglobulin issue. In addition to the above mentioned patient details, addition information must be provided on these forms. Additional mandatory fields include:

- Serology history
- Event/ reason for request, time of event and gestation period

- Has anti-D immunoglobulin been given at this admission?
- Confidentiality concerns for home issue. If there is a confidentiality problem then this must be indicated on the form.
- Sample taken and positively identified by (including date and time of sample)
- Baby details, forename, surname, DOB, hospital number
- Baby sample taken and positively identified by (including date and time of sample)

General Blood Transfusion Request Forms

General blood transfusion request forms are used for Group and Save (G&S) and Direct Antiglobulin Tests (DAT/DCT), as well as requesting blood components. Please indicate the Diagnosis/ Reason for Request on the form, avoiding unqualified terms such as anaemia.

In addition to the general requirements, it is **essential** that the 'special requirements' section is completed. This refers to the need for irradiated blood, CMV negative, HEV negative etc. Information about the indications for special requirements can be found in appendix 6, or one the back of the general blood transfusion request form.

If special requirements are needed, this **must be specified,** with a reason. A Special Requirements Notification (appendix 3) must also be submitted to the blood transfusion laboratory. If no additional provisions are required then the **neither** box must be ticked. Guidance on special requirement indications is provided on the back of the request form.
Any suspicion of, or confirmed, pregnancy must also be documented on the form.

Incomplete Form Procedure for Blood Transfusion

If the form is received with **only** the special requirements information missing it can be processed **but** a new form must be requested immediately.

In **all** other cases the sample will **not** be processed until a new form is received. Blood components will **not** be issued prior to receipt of a correctly completed form.

Requests which are not signed by the person taking the sample are **not** acceptable; this includes those from outlying hospitals

Requesting Blood Products

When requesting FFP, cryoprecipitate, platelets, or red cells, this must be completed as an 'add on' request. If the laboratory holds a valid group and save sample for the patient, a request form only may be sent. For details of G&S sample timings, see appendix 4. For babies who require an 'add on' request, a new request form must be sent. If there is no valid group and save, a new sample must be sent.

If a transfusion is required the following information must be completed:

- The number of units (or mLs) required.
- Date and time required. Please give a time and avoid use of vague comments such as ASAP.

7. Labelling of Specimens

General Guidance

It is the responsibility of the requesting clinician to ensure that the patient has been positively identified and samples are correctly labelled to the agreed standard. Addressograph stickers should not be used to label samples and clinicians must **NEVER** pre-label sample bottles, with the exception of urine and stool sample bottles given to patients for collection at home. These should be labelled with patient details prior to being handed to the patient, along with the completed request form. Patients should be asked to complete the sample time and date following collection.

Details on the request form and sample **MUST** match. If request forms and/or specimens are received unlabelled, or inadequately labelled, the receiving laboratory reserves the right to discard the specimen for medico-legal reasons. This will be recorded in the laboratory IT system.

Samples not meeting these requirements will only be processed in exceptional circumstances, e.g. unrepeatable or precious specimens.

Samples should be labelled, as a minimum with:

i. NHS/S Number
ii. Patient's full name (surname and forename initial not acceptable), or unique coded identifier
iii. Date of birth – indicate if unknown
iv. Location of patient
v. Date and time of specimen collection – essential for time sensitive tests (see relevant test directory, appendix 12, for sample timing requirements)
vi. Nature of sample, if unique or unclear.

ICE generated sample labels containing the above information can be used, with the exception of blood transfusion specimens (see below).

When ICE is down and requests cannot be made electronically, GP's are advised to use hand written request forms and hand written blood tubes. The sample acceptance criteria remains the same with the sample being labelled with a minimum of 3 identifiers from

i. NHS/S Number
ii. Patient's full name (surname and forename initial not acceptable), or unique coded identifier
iii. Date of birth

High Risk samples must be sent in accordance with the Trust Policy, Infection Prevention Management Guidelines of Patients with Known or Suspected Blood Borne Viruses. Samples which are identified as 'known High Risk' must be labelled as such and sent in a biohazard bag. If a known High Risk sample is received that is not in a biohazard bag, a DATIX report will be completed.

Blood Transfusion Samples

The Blood Transfusion laboratory operates strict policy with regard to sample labelling. Any samples with are incorrectly or insufficiently labelled cannot be amended, and must be rejected. The **ONLY** exceptions to this are:

- Home delivery baby samples for Kleihauer testing can be accepted without a unique identification number to prevent delay in administration of anti-D
- Stem Cell and BMT donor samples (Anthony Nolan, DE CAM etc.) which are received in the laboratory for confirmation of blood group may originate from locations outside the UK and so will not have S or NHS numbers
- Casualty and flying squad numbers:
    - If patients arrive at A&E unconscious and cannot be identified, they will be called Unknown Male or Unknown Female. Such samples will be accepted if labelled with the S number and estimation of age.
    - If the flying squad team attends an accident and blood samples are taken, these may be labelled with a flying squad number. These are pre-prepared in case of major incident, and the patient is identified by means of a tabard with this number on it. The request form and all samples will have this number on, and an indication of age and sex. This form of labelling is acceptable for the provision of blood components.

All samples must be labelled **by hand**; addressograph labels are not acceptable unless they are 'demand printed' Blood Track sample labels (see below).

MAJAX Samples

If a major accident (MAJAX) is declared, unknown patients will be labelled with an 'S' number and gender only. These details must be used until the patient's true identity is known. This is in accordance with the UHL Major Incident Plan (available on UHL Connect).

Unrepeatable & Precious Samples

Certain specimens processed within the Blood Sciences Department are collected through invasive procedures (e.g. bone marrow biopsies) or cannot be repeated (e.g. forensic samples). These are known as unrepeatable or 'precious' samples, identifying their unique nature. If a laboratory receives such a sample which is not labelled correctly, additional processes are used to safely identify the origin of the specimen and allow it to be processed. **THIS IS ONLY FOR PRECIOUS OR UNREPEATABLE SAMPLES, AT THE DISCRETION OF THE LABORATORY.**

Precious or unrepeatable sample types include:

- Bone marrow
- Cerebrospinal fluid (CSF)
- Forensic specimens
- Tissue/stone samples

8. Specimen Rejection Criteria

The department is committed to providing a safe service for our users and as such, will **not** process any samples where the patient information on sample and form do not match, or is incomplete as discussed above. Other rejection criteria include:

Issues with sample

- Sample too old to process
- Clotted (with anti-coagulated samples)
- Haemolysed samples
- Leaking samples
- Incorrect sample type
- Over/under filled – N.B coagulation samples **MUST** be filled to the volume line indicated on the bottle

Issues with labelling

- Unlabelled samples are unacceptable
- Specimens without forms will not be processed
- Request forms not containing the minimum number of identifiers.
- Samples not containing the minimum number of identifiers

ONLY 4.9 mL brown topped gel serum samples acceptable from adults for tests assayed on automated analysers used in Fast track Blood Science laboratory (see brown top table section of specimen collection table for test examples.

9. Sample Collection Criteria

In addition to being correctly labelled, it is essential that any specific sample collection and transport criteria are also observed. These can include temperature requirements (transported on ice, at 37°C etc.), speed of receipt (i.e. must be received by the laboratory within a certain time following phlebotomy) or total sample volume. More information can be found in the specific test entry within this handbook. All material used for the sample collection, should be

disposed of in accordance with your local and national clinical waste disposal guidelines & regulations. For Hospital Users, this should be in accordance with UHL Trust Waste Disposal policy.

Order of Draw

Cap Colour	Tests
Blood Culture collection kit	Blood Cultures
Brown top Serum gel bottle 	Urea & Electrolytes, Liver Function Tests, Bone Profile, CRP, Tumour Markers, Thyroid Function Tests
Green Sodium Citrate bottle 	Coagulation studies (Must be filled to the full draw)
Orange Lithium Heparin bottle 	Troponin (A & E and inpatient only)
Purple EDTA bottle 	HbA1c
Pink/Red EDTA bottle 	Full blood count Parathyroid Hormone (PTH) (Separate bottle needed)
Yellow Fluoride EDTA bottle 	Glucose, Lactate

Patient Collected Samples

Some samples may need certain requirements on behalf of the patient (e.g. fasting prior to sample collection, early morning specimen etc.), whilst others will need to be collected by the patient themselves (e.g. 24hr Urine samples). For information about and additional collection requirements, please see the appropriate assay entry in the relevant test directory (appendix 12).

10. Sample Storage

Sample storage is of particular importance, as incorrect storage and handling conditions can render a sample unfit for testing. For further information about key pre-laboratory storage and handling criteria (e.g. overnight storage conditions if unable to send sample on same day as collection), please see appendix 2b for Chemistry samples. Individual test requirements may also be found in the relevant assay entry in the test directory (appendix 12).

Once analysed, specimens are kept so that further tests can be undertaken or repeated, if required. The length of time that samples are kept varies, depending upon the stability of the analyte and nature of the sample. Retention times vary from 3 days (general haematology/biochemistry) to indefinite storage (DNA for molecular haematology).

Sample storage requirements, such as temperature, will also vary. Samples will be stored in conditions that best maintain sample integrity for the tests being conducted. For further details, please contact the relevant laboratory.

11. Additional Tests (Add-ons and Reflex Testing)

Clinicians may request extra tests on a sample already in the department but these can only be completed if the analyte or cells are sufficiently stable. Such requests must be accompanied by a new form for the extra test(s) required.

GP requests to add on additional tests should be made by phoning the laboratory results and enquiries line. The final decision to perform an add-on test will rest with the laboratory, and will be influenced by the delay in receiving the request, and the stability of the analyte/cells concerned. Specific 'add-on' criteria can be found in the appropriate entry of the test directory (appendix 12).

Reflex Testing

In certain instances, the laboratory may add on additional tests or request additional samples to aid in clinical interpretation of results. **This will be done without the authorisation of the requester.**

12. Specimen Contamination

When taking blood samples for multiple investigations, remember that anticoagulants present in specimen bottles may cause problems if carried over from one type of container to another; always fill EDTA bottles last as EDTA interfered with many biochemistry assays, especially potassium and calcium measurement.

Spurious Results

Inappropriate samples collection, storage and transport can interfere with a number of results. Some examples are given below:

Problem	Common Causes	Effect
Inappropriate collection site	Sample taken from drip arm	Increased drip analyte e.g. potassium, glucose Dilution effect - low results Prolonged coagulation results e.g. contamination with heparin
Haemolysis	Expelling blood through a needle into the tube, vigorous shaking, extremes of temperature	Increased potassium, phosphate, ALT, LDH, magnesium, iron Reduced haemoglobin measurement Abnormal coagulation results e.g. increased D-dimers
Storage	Biochemistry samples in a fridge	Increased potassium

	Haematology samples >24hours old	Red cell swelling and white cell changes
Delay in separation of serum/plasma	Overnight storage, delay in transit	Increased potassium, phosphate, LDH Deranged clotting
Labile analytes	Not immediately separated and frozen	Decreased ACTH, gastrin and homocysteine
Incorrect container or anticoagulant	No fluoride oxalate EDTA contamination Li sample collected into Li Heparin Sodium in Na Citrate	Decreased glucose Decreased calcium, magnesium and alkaline phosphatase Increased potassium Increased lithium Increased sodium, decreased calcium
Clotted sample (anti-coagulated specimens)	Poor sample mixing at collection Sample activation during venipuncture	Decreased haemoglobin and platelet counts Deranged clotting E.g. prolonged coagulation results if fully clotted, shortened results if activated.
Lipaemic specimen	Sample collected soon after ingestion of high-fat meal	Affects any assays which employ optical detection methods E.g. Raised Haemoglobin
Icteric specimen		

13. Specimen Transport

All specimens should be deposited in individual sealed, leak proof bags/containers and transported on/in an appropriate trolley, tray or receptacle that will contain leaks and spills. It is recommended that all trolleys used for sample transport have available spill kits, including an approved disinfectant and absorbent cleaning material.

Samples and forms contain confidential patient information and it is important that samples are transported in a way which maintains confidentiality. All specimens must be taken directly from source to the laboratory. This should be done in a timely manner, to ensure the integrity of the specimen.
Specific transport requirements can be found associated with the assay entry in the test directory (appendix 12).

Primary Care

Primary Care samples are collected by the community drivers at least once a day. To enable efficient processing within the department, a coloured bag system is used:

Bag Colour	Department
Red	All urgent samples
Green and Red	Any Fast Track request that includes Urea & Electrolytes, Bone Profile
Green	Any Fast Track request that doesn't meet the above conditions
White Bag	Special Chemistry
Purple Bag	Antenatal Screening samples
Striped Bag	Immunology

Other departments – Please see handbook for these departments for further details	
Yellow	Histology
Blue	Microbiology & Virology

Please see Appendix 2c for the coloured bag system for sending samples to Pathology

Inpatient - Urgent

These are defined as samples which may yield results that will affect immediate patient management. Where present, the pneumatic air tube system should be used for the transport of urgent samples. However, the following specimens MUST NOT be transported via the air tube system:

- High risk specimens*
- HMDL Samples
- Specialist H&T Tests
- Cerebrospinal Fluid (CSF) samples
- Samples on ice
- Blood products
- Glass containers

*High risk samples cannot be sent by air tube systems.

Where the air tube system is not present, or the specimen meets one of the above conditions, hand delivery via the porters or ward staff is required.

When using the air tube system, please be aware that:

- Only authorised members should use the air tube system, and steps must be taken to ensure the health and safety of those using it.
- It is the responsibility of the 'sender' to operate the system correctly, and to have back-up systems in place for when the system is unavailable or not performing correctly.
- Specimens must be placed into sealed specimen bags. Any leaking samples must not be sent.
- Samples must be transported using an air tube carrier (also known as 'pod'). The lid must be secured before sending.

Inpatient - Routine

Porters collect routine samples from all wards and outpatient departments on their planned route, and if specifically requested.

Please note: In all cases, the Blood Sciences Department is not responsible for the porter service at any of the three UHL sites. Advice on the collection and transport of samples is available on request from the laboratories.

Major Haemorrhage Samples

Following activation of the Massive Haemorrhage Policy (MHP) at LRI only, Interserve will assign a porter for delivery of urgent samples to Blood Transfusion and for collection of products and components. The air tube system must not be used for urgent samples.

At LGH and GH urgent samples can be hand delivered directly to the laboratory by a member of the ward staff or assigned 'runner'

The Blood Transfusion laboratory must always be contacted when urgent samples are being sent so they can be prioritised

Outpatient

Samples collected from outpatient departments are analysed at the LRI. For samples collected from clinics held at the Royal Infirmary, these samples will be transported to the laboratory by porter or air tube system. For samples collected from LGH or GH outpatient departments, these will be transported to the LRI for testing, unless there are specific sample stability concerns in which case they will be analysed at site of collection.

Pathology Transport Service

UHL provides a transportation network for the collection of samples collected by GP surgeries within the Leicestershire area. These samples are transported to the Leicester Royal Infirmary for analysis.

The Pathology Transport Service provides a third party transport route between the three hospital sites within UHL. This is used for the transport of specimens (if the required test is conducted at a different site to where the sample was collected), blood products and laboratory equipment.

Samples should be delivered to the local laboratory, who can then arrange further transport using the Pathology Transport System as required.

Transportation outside of UHL

Occasionally, samples may need to be sent to referral centres for specialist testing not offered by UHL. In these circumstances, samples may be transported to external laboratories by a courier/taxi service, or using the Royal Mail postage service, dependent upon the nature of the specimen and the requirements of testing.

Some samples will need to be sent to referral laboratories directly from clinical areas, rather than by the local laboratory. Local protocols will be available to detail how and when samples should be packaged and sent. These MUST be followed to maintain sample integrity, and ensure safe transport of the specimen

It is important to note that all samples transported by road (whether provided by UHL transportation or external services) MUST abide by the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ISBN 13 9789211391121)

14. Results

Results are only released from the laboratory once they have been authorised. This may be a manual or automatic process, depending on the test. Authorised results can be accessed electronically via ICE or iLab. If users do not have access to iLab or ICE, the pathology results line will be happy to provide verbal results. They can be contacted on 0116 258 6531/7999 Mon-Fri between the hours of 09:00-17:00. Please note under no circumstances can results be released to or discussed with the patient or relatives on the telephone. Doctors are requested not to inform patients that they can ring the laboratory to obtain the results or any blood or other test.

If an erroneous result is issued, the clinical area will be notified of the error and the result will be recalled. The laboratory may then request an additional sample for repeat testing.
If an amended report is issued, a comment will be added to identify this.

In exceptional circumstances, provisional results may be released where it is felt these are essential to the immediate management of the patient. These will be identified as provisional at the time of release.

For any concerns over the limitations to test results can be discussed by contacting the laboratory.

Telephone Limits

If the laboratory encounters a result which is identified as being critical in nature (i.e. suggests a significant risk to the patient), the result will be telephoned to the extension or bleep number provided on the request form. This is to highlight the abnormal result to the clinician so they may act on it (if required) in a timely fashion. If no number is provided, the ward/GP practice will be contacted instead. The critical telephone limit for a given test (if applicable) can be found in the appropriate assay entry in the test directory (appendix 12).

15. Release of Samples to the Police

The police may at any time request the release of specimens received by the laboratory for testing. The credentials of the police officer will be established by their warrant card.

Patient consent is required to release their samples to the Police (or any other body, or person). However, there are exceptions when samples may be released by the laboratory without patient consent including:

a) Where serious public harm or a serious offence has occurred
b) Where release of samples is provided for in statute law such as notifiable diseases, prevention of terrorism, or where the laboratory is required to produce samples by a court order.

If the patient is unwilling to give consent, the police officer is required to present an order from a judge, unless the patient is the subject of a police investigation related to a road traffic offence (e.g. drink / drug driving).

Post-mortem samples taken under the guidance of HM Coroner may be released to the police following approval from HM Coroner or a court of law.

16. Measurement Uncertainty

In any laboratory process, there will be a degree of variability dependant on the test performed. This can be due to the handling and storage of the specimen, analytical processes or reporting and interpretation of results. For every procedure conducted within the department of Blood Sciences, non-pathological factors with the ability to influence results have been identified and minimised as much as feasibly possible.

All critical equipment and systems are calibrated to ensure accuracy of measurement and such calibration systems are traceable to a national or international standard. Information is also provided by the manufacturer regarding precision of equipment and any other factors which may influence the certainty of measurement. All staff undergo regular training and competency assessment in procedures and processes to ensure that they are competent to carry out the testing procedure.

Measurement uncertainty is particularly important to consider when results lie around clinically significant cut-offs, as patient management may be influenced by the result interpretation.

In order to provide an indication of the analytical uncertainty, the laboratory calculates a measurement uncertainty for each assay which produces numerical results. This value is the amount by which the actual result could differ from the result quoted (with a confidence interval of 95.5%). For example, a sodium result of 135 mmol/L has a measurement uncertainty of ± 3 mmol/L meaning that we can be 95.5% confident that this result is between 132 mmol/L and 138 mmol/L.

In addition, results may vary within an individual due to their biological variability. Information about this variability is available from the laboratory and can be used in conjunction with analytical uncertainty above to estimate how likely it is that two results on a patient are significantly different.

Details of measurement uncertainty for individual tests can be provided on request.

17. Quality and Governance

Incidents

Incidents and Non-conformances within our departments including screening services are investigated and documented within our Quality Management System.

Confidentiality and Personal Information

The laboratory is committed to maintaining patient confidentiality and practices Caldicott principles. No Trust employee shall misuse any personal information, or allow others to do so, and staff are protected from inappropriate

use of their details. Laboratory staff follow the Trust Policy for Protection and Use of Personal Information (available in UHL Connect) to ensure compliance with the Data Protection Act, NHS directives and other legislative requirements which govern how confidential information must be processed.

At times this will mean that electronic communications (phone, fax, email) to and from the laboratory may be constrained by these protocols to preserve patient confidentiality.

Under NO circumstances can results be released to or discussed with the patient or relatives on the telephone. Doctors are requested not to inform patients that they can ring the laboratory to obtain the results of any blood or other test.

Duty of Candour

As an NHS service provider we are required by law to comply with the duty of candour. This means that we must be open and transparent with service users about their care and treatment, including when it goes wrong.

Audit

The department adheres to a rigorous audit schedule, aimed at monitoring our practice against appropriate standards and identifying areas of improvement. The audits contained within this calendar are designed to cover key aspects of each individual laboratory and is reviewed on an annual basis.

External Quality Assurance

The Blood Sciences service participates in a full range External Quality Assurance programmes surveys, covering all available areas of the department. Providers of these services include:

- NEQAS
- Qualaris
- Binding Site

Research and Development

The laboratory supports a number of local and national clinical trials. Before undertaking any investigations which are part of a clinical trial protocol, the relevant Head of Department must be approached and permission sought as the Directorate may charge for such work. For possible research collaborations, please contact the Head of Service or Laboratory Manager to discuss.

18. Informed Consent

It is the responsibility of the clinical requester to ensure that the patient has been adequately supported to make an informed consent to testing. With the exception of Blood Transfusion samples (see below) or samples obtained from invasive procedures (e.g. bone marrow biopsies which require specific consent as per UHL protocols), provision of a request form and an associated sample to the pathology service is taken as consent to testing. The laboratory will conduct testing according to the information given on the request form.

Samples sent to our Laboratories for testing may be used for additional Quality assurance processes to improve the services we offer.

Consent for Blood Transfusion

Blood Transfusion carries potential risks, some of which may be serious or, very rarely, life threatening. The Department of Health's Better Blood Transfusion 3 circular (HSC 2007/001) required NHS Trusts to implement a number of actions to improve appropriate use of blood and safety of transfusion. One of these actions was to ensure patients are well informed of the risks and benefits of blood transfusion, and that this discussion is clearly documented in the patient case notes. UHL Trust therefore implemented a formal consenting process to ensure patients are fully informed and aware of the risks, benefits and implications of receiving a blood transfusion.

All patients must give written consent to receive a blood component transfusion. Where the patient is unable to give written consent, the clinician must proceed in the best interests of the patient as with any other emergency situation.

The consenting process is outline in the Blood Transfusion Integrated Care Pathway, which also contains 2 'peel-off' stickers. These are intended for use on the standard UHL consent form, of which the patient will be given a copy.

19. User Comments, Suggestions, Compliments and Concerns

The Department encourages feedback and comments regarding the quality of the service provided to our users and any suggestions as to how services can be improved. We would welcome any proposals for multidisciplinary clinical audit, suggestions for new tests to be added to the service's repertoire or evidence of altered frequency of testing to facilitate evidence-based practice appropriate for the needs of our users.

Compliments and concerns, written or verbal, should be directed to Yusuf Sidat (Quality Manager), Operational Head of Service, Deputy Service Managers or Clinical Leads of the relevant department. All concerns are logged, investigated and responded to with corrective actions implemented as appropriate to improve the quality of the Blood Sciences service. Compliments are communicated to appropriate staff.

All Complaints are dealt with by The Trust Patient Advice and Liaison Service (PALS.)
Any complaints received by the department are forwarded ASAP to the PALS service.

To contact PALS
Freephone: 0808 178 8337
Fax: 0116 258 8661
Email: uhl-tr.pals@nhs.net
Online: https://www.uhleicester.nhs.uk/patients-visitors/support/feedback-complaints/pals/

In accordance with the Blood Safety and Quality Regulations (BSQR), all complaints and other information concerning potentially defective products or components will be reviewed carefully according to written procedures in order to promptly and effectively recall any products or components known or suspected to be defective.

We strive to continually improve the services we provide and we would appreciate if you took a few moments to complete the survey below:

https://forms.office.com/e/hpPrW9Ej8A

20. Useful Resources

Clinical Guidelines

Clinical guidelines are available for all specialisms within Blood Sciences. These guidelines are produced by panels of national experts in each field and identify best practice with regards to diagnosis and treatment of the patient. The following are some societies which provide such guidance, although please note this is not an exhaustive list.

British Society for Haematology:
https://b-s-h.org.uk/guidelines/

International Society on Thrombosis and Haemostasis:
https://www.isth.org/?page=GuidanceDocuments

Haemoglobinopathy Screening Programme:
https://www.gov.uk/government/publications/handbook-for-sickle-cell-and-thalassaemia-screening/sickle-cell-and-thalassaemia-screening-programme-handbook-overview

British Society for Allergy & Clinical Immunology:

http://www.bsaci.org/Guidelines/bsaci-guidelines-and-SOCC

NHS Blood and Transplant:
http://hospital.blood.co.uk/clinical-guidelines/nhsbt-clinical-guidelines/

Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee:
https://www.transfusionguidelines.org/

National Institute for Health and Care Excellence:
https://www.nice.org.uk/guidance

National Institute for Health and Care Excellence (Cholesterol, HDL and LDL:
https://cks.nice.org.uk/topics/lipid-modification-cvd-prevention/#!management
https://www.lmsg.nhs.uk/useful-links/

Patient Information Leaflets

The provision of high quality, evidence-based information for patients is essential not only for informed consent, but also to empower people to be involved in their own healthcare decisions. Patient information leaflets are available for certain procedures within Blood Sciences, usually those deemed invasive, or for patient collected specimens (e.g. urine). For more information about what patient information leaflets are available regarding sample collection, please contact the relevant laboratory.

Online Resources

While this handbook aims to provide all relevant information for accessing and utilising the services provided by the Blood Sciences department at UHL, there is a wealth of information available online regarding testing strategies, analytical techniques and diagnostic markers. In addition to the guidelines suggested above, the following websites provide useful information which can aid in the identification of useful diagnostic tests:

Up-to-Date:
https://www.uptodate.com/home

Practical Haemostasis:
http://practical-haemostasis.com/

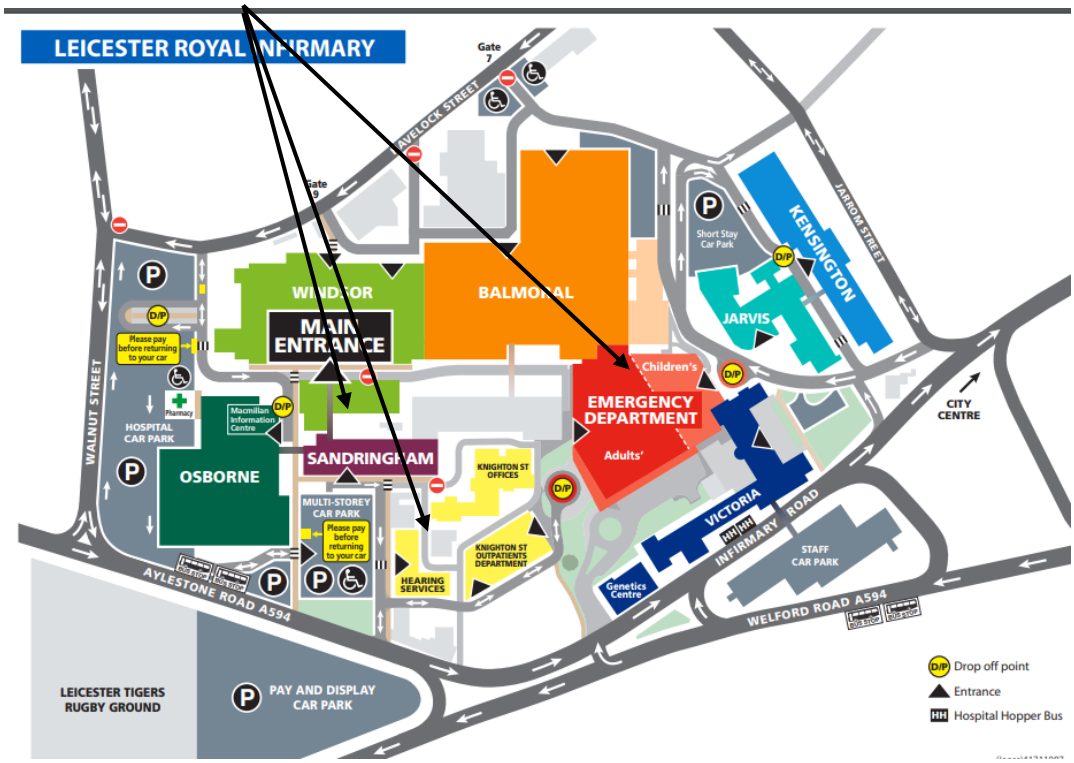
Labtestsonline:
https://labtestsonline.org.uk/

NHSBT Services:
http://hospital.blood.co.uk/diagnostic-services/

Appendix 1: Map Locations

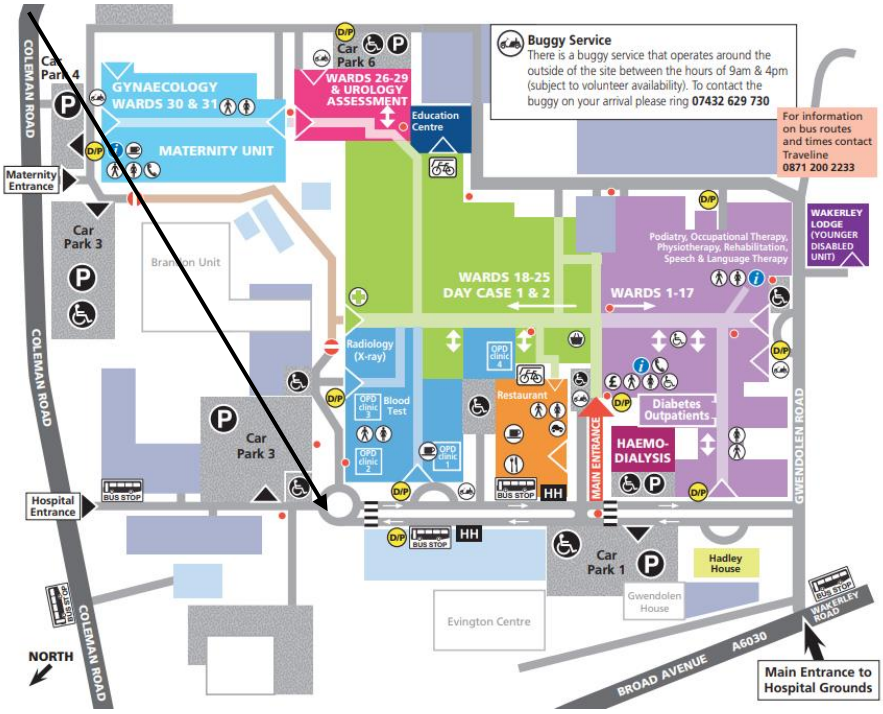
Leicester Royal Infirmary

The Blood Sciences Department is primarily found on levels 2 and 4 of the Sandringham building. The Immunology laboratory is located on level 1 in the Hearing Services Building. An additional satellite laboratory is located within A&E department



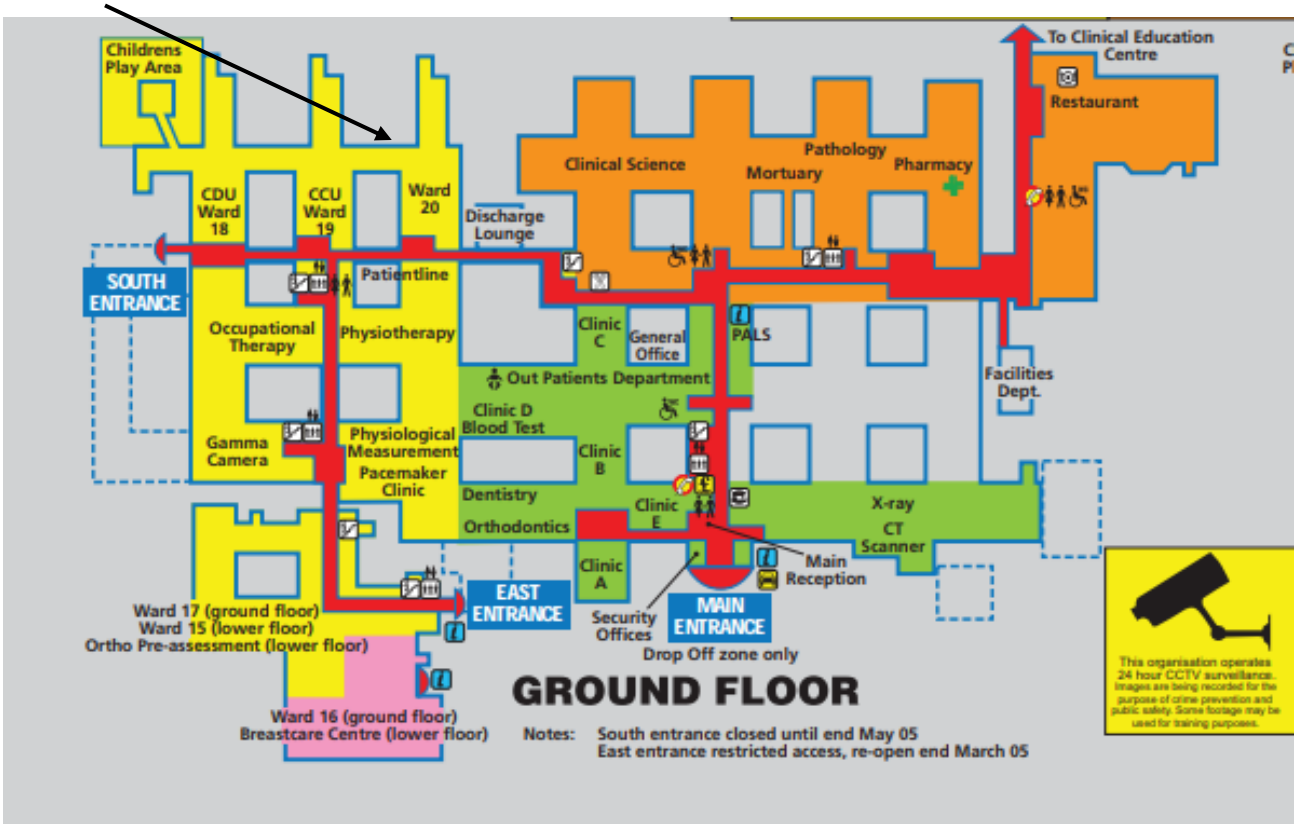
Leicester General Hospital

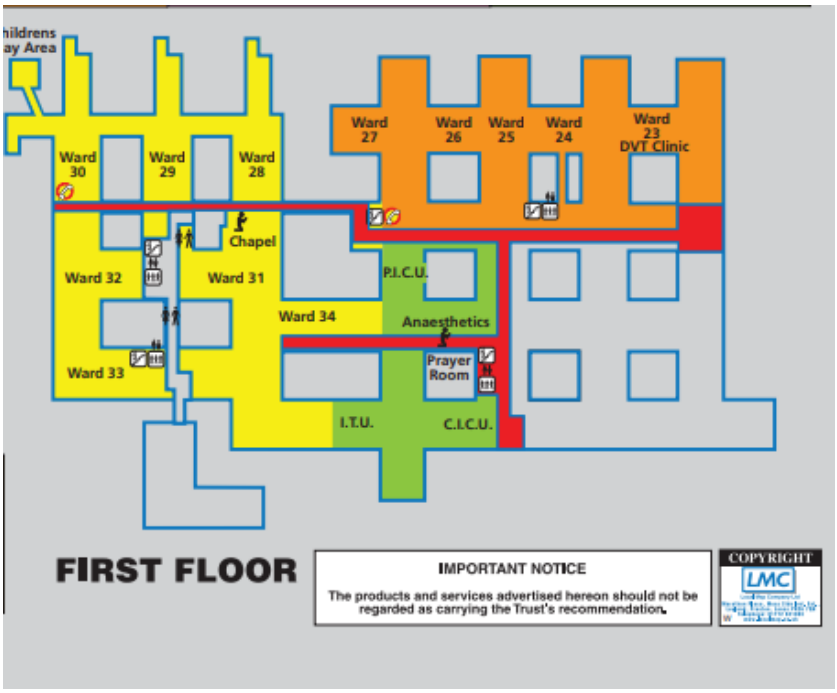
The entrance to pathology laboratories is located at the end of the link corridor signposted for “Blood Test” and “Pathology”, leading off the main corridor.



Glenfield General Hospital

The entrance to Pathology Laboratories is located on ground floor in zone 2





Appendix 2a: Sample Containers

Name	Volume	Details	
Serum	Adult: 10mL Paediatric: 1.2mL	White top monovette containing no gel separator	
Serum Gel	Adult: 4.7mL Paediatric: 1.2mL	Brown top monovette containing separating gel	
Lithium Heparin	Adult: 4.7mL Paediatric: 1.2mL	Orange top monovette containing Heparin anticoagulant	
Fluoride EDTA	Adult: 2.7mL Paediatric: 1.2mL	Yellow top monovette containing fluoride EDTA	
Random Urine (Including Microalbumin):	9 mL	Vacutest Kima white top tube	
Fluid (Pleural/Ascitic and other fluids)	10 mL	Plain sterile white top universal container	
24hour Urine: Plain or acid preserved	N/A	Supplied with collection instructions. (Please note down start and finish collection date and times)	
K-EDTA	Adult: 2.7mL Paediatric: 1.2mL	Pink top bottle monovette containing Potassium EDTA anticoagulant	
Citrate	Adult: 4.3mL A&E: 1.8mL Paediatric: 1.4mL	Green top monovette containing Sodium Citrate anticoagulant	

EDTA	2.7mL ONLY	Purple top monovette containing Potassium EDTA anticoagulant	
EDTA ''For Blood Transfusion''	Adult: 7.5mL Paediatric: 1.6mL Neonatal: 1.6mL	Blue Top monovette containing Potassium EDTA anticoagulant	
Faecal (Stool) samples	Pea size	Blue Top Universal plain bottle with spoon	
Faecal (Stool) sample (For Faecal immunochemical test (FIT) ONLY)	As stated in information sheet with kit	Supplied with collection instructions White top picker – contains extraction buffer.	

Appendix 2b: Sample Storage and Handling Requirements

Storage of Samples for Chemical Pathology Tests.

Pathology specimens should be transported to the laboratory as soon as possible after collection. Delay could result in deterioration in the specimen and invalidate the results of the investigations carried out.

On occasions there may be an unavoidable delay in transporting samples to the laboratory. This document provides guidance on which samples may be stored overnight and how to store these samples to prevent deterioration.

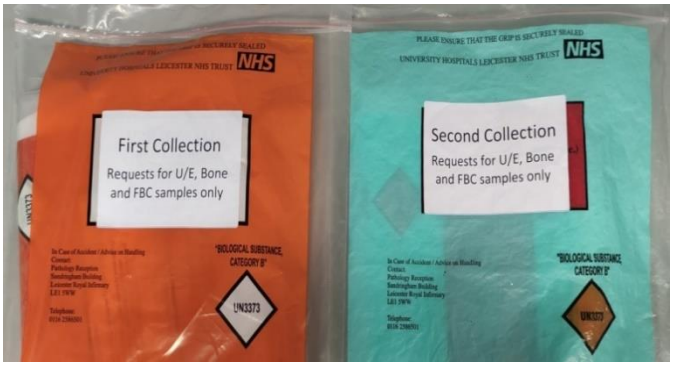
Test/Profile	Bottle	Storage of Sample
U&E's (sodium, potassium, urea and creatinine) **LFT's** (ALT, ALP, Bilirubin) **Bone Profile** (Albumin, Calcium, Phosphate, ALP)	 Serum Gel	DO NOT STORE Sample to be sent to lab within 6 hours. Do not put in a fridge prior to sending sample to the laboratory
Troponin	 Lithium Heparin	DO NOT STORE Sample to be sent to lab immediately
Glucose	 Fl/Ox tube	OK to store whole blood in fridge overnight
PTH	 EDTA tube	DO NOT STORE Sample to be sent to lab within 6 hours.
HbA1C	 EDTA tube	OK to store whole blood in fridge overnight

GGT	 Serum Gel tube	OK to store whole blood in fridge overnight
Magnesium	 serum Gel tube	DO NOT STORE Sample to be sent to lab within 6 hours
Cortisol	 serum Gel tube	OK to store whole blood in fridge overnight
PSA	 serum Gel tube	OK to store whole blood in fridge overnight
CK	 serum Gel tube	OK to store whole blood in fridge overnight
Lipids (Cholesterol, triglycerides)	 serum Gel tube	OK to store whole blood in fridge overnight
Lipid Profile (fasting) (Cholesterol, triglycerides, HDL cholesterol, LDL cholesterol)	 serum Gel tube	OK to store whole blood in fridge overnight
Gender Hormones (LH, FSH, Oestradiol, prolactin, progesterone, testosterone, SHBG)	 serum Gel tube	OK to store whole blood in fridge overnight
Tumour Markers (CA125, CA19.9, CEA, AFP, HCG)	 serum Gel tube	OK to store whole blood in fridge overnight

HCG (pregnancy)	 serum Gel tube	OK to store whole blood in fridge overnight
Digoxin	 serum Gel tube	DO NOT STORE Sample to be sent to lab within 6 hours.
TDMs (Paracetamol, Salicylate, Lithium, Theophylline, Anti-convulsants)	 serum Gel tube	OK to store whole blood in fridge overnight
Lead	 EDTA tube	OK to store whole blood in fridge overnight
Osmolality	 Serum Gel tube	DO NOT STORE Sample to be sent to lab within 6 hours (assay in conjunction with a random urine sample)
Others NOT listed		Please phone the laboratory

Notes:-
Some surgeries have access to a centrifuge. In these instances samples can be spun down according to the manufacturers guidance and stored in the fridge prior to sending to the laboratory for analysis the following day. Specimens for room temperature storage should not be exposed to extremes of temperature e.g. placed in direct sunlight, near a heat source (e.g. radiator) or allowed to chill or freeze. Ideally, they should be kept in an insulated container between 20°C – 25°C.

Appendix 2c: Coloured Bag System for Sending Samples to Pathology



Use ORANGE bag for **1st Collections (AM)** for U&E/Bone & FBC samples.
Use LIGHT GREEN bag for **2nd Collections (PM)** for U&E/Bone & FBC Samples

RED OUTER BAG
URGENT CHEM AND HAEM TESTS ONLY e.g. INR, Malaria, BHCG, Digoxin, Chemo patients, Temporal Arthritis, Downs screening, transfusion bloods

BLUE OUTER BAG
MICROBIOLOGY AND VIROLOGY
Including urgent Microbiology and Virology requests

GREEN OUTER BAG
CHEMISTRY and HAEMATOLOGY
Blood samples only.
No U&E/Bone/FBC requests
Non-blood into White bag.

YELLOW OUTER BAG
HISTOLOGY and CYTOLOGY requests
e.g. Minor Ops, Cervical Smears

PINK / WHITE OUTER BAG
IMMUNOLOGY samples only

WHITE or BLACK OUTER BAG
Non-blood samples for Chemistry testing
e.g. Urine Microalbumin, urine drug screens. FIT testing

PURPLE OUTER BAG
Antenatal Screening Samples
All antenatal samples including: IDPS & antibody screen, Haemoglobinopathy Screening (sickle cell & thalassaemia), Booking bloods

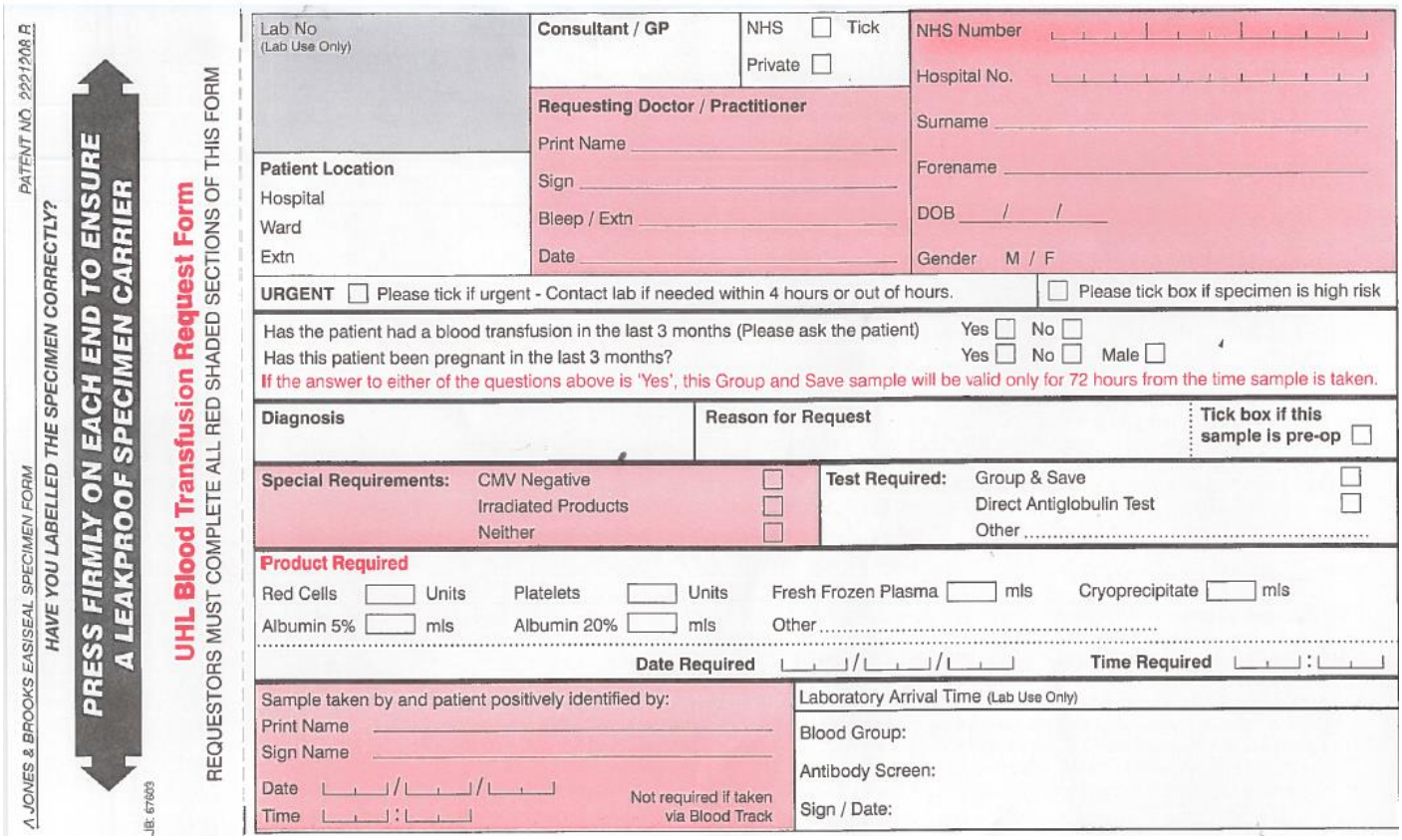
- This packaging system will need to be adopted by all staff who take and/or pack pathology samples. This may include nursing, reception and midwife staff groups.
- Please use electronic requesting
- Please place forms inside the bag face-up and ***do not fold them***. This helps our team process the samples as quickly as possible.
- Please include full patient name, unique identifying number, Date of birth and the date and time of sample collection on all samples, to comply with our acceptance & rejection criteria

For queries please call the Specimen Reception Managers on 0116 2586570 or email;
paul.staples@nhs.net or jason.blake1@nhs.net

Appendix 3: Blood Forms

Blood Transfusion

General Blood Transfusion Requests



PATENT NO. 2221208 B

A JONES & BROOKS EASISEAL SPECIMEN FORM

HAVE YOU LABELLED THE SPECIMEN CORRECTLY?

PRESS FIRMLY ON EACH END TO ENSURE A LEAKPROOF SPECIMEN CARRIER

UHL Blood Transfusion Request Form

REQUESTORS MUST COMPLETE ALL RED SHADED SECTIONS OF THIS FORM

JB: 67603

Lab No (Lab Use Only)

Consultant / GP

NHS ☐ Tick

Private ☐

NHS Number

Hospital No.

Requesting Doctor / Practitioner

Print Name

Sign

Bleep / Extn

Date

Surname

Forename

DOB / /

Gender M / F

Patient Location

Hospital

Ward

Extn

URGENT ☐ Please tick if urgent - Contact lab if needed within 4 hours or out of hours.

☐ Please tick box if specimen is high risk

Has the patient had a blood transfusion in the last 3 months (Please ask the patient) Yes ☐ No ☐

Has this patient been pregnant in the last 3 months? Yes ☐ No ☐ Male ☐

If the answer to either of the questions above is 'Yes', this Group and Save sample will be valid only for 72 hours from the time sample is taken.

Diagnosis

Reason for Request

Tick box if this sample is pre-op ☐

Special Requirements: CMV Negative ☐ Irradiated Products ☐ Neither ☐

Test Required: Group & Save ☐ Direct Antiglobulin Test ☐ Other .....

Product Required

Red Cells ☐ Units Platelets ☐ Units Fresh Frozen Plasma ☐ mls Cryoprecipitate ☐ mls

Albumin 5% ☐ mls Albumin 20% ☐ mls Other .....

Date Required / / Time Required :

Sample taken by and patient positively identified by:

Print Name

Sign Name

Date / /

Time :

Not required if taken via Blood Track

Laboratory Arrival Time (Lab Use Only)

Blood Group:

Antibody Screen:

Sign / Date:

Kleihauer Request Form

KLEIHAUER REQUEST FORM (Request for Anti-D Immunoglobulin)

Lab Number	Consultant	NHS Number Hospital No. Surname Forename DOB ___/___/___ Address Postcode
Patient Location Ward Hospital Contact Tel. No.	Requester Print Name Sign Bleep Number Date	

URGENT ☐ Please tick if a blood group result is needed within 2 hours and contact laboratory

Patients Blood Group	Does the patient have blood group Antibodies? YES / NO Details	Has the patient received Anti-D Immunoglobulin previously during this pregnancy? YES / NO Date

Event / Reason for Request | Date / Time of Event | Gestation

Has Anti-D been given at this admission

YES / NO | Dose | Date | Time

Sample taken by and patient positively identified by

Name | Sign | Date | Time

Baby's Laboratory Number	Baby's Detail Baby's Hospital No. ___ Surname ___ DOB ___/___/___ Forename ___

Baby's sample taken by and baby positively identified by

Name | Sign | Date | Time

FOR LABORATORY USE ONLY

Date / Time of Receipt

Mother's Group Sign	Is a Kleihauer Film Required YES / NO Sign	Alkaline Denaturation Results Sign
Baby's Group Sign	Kleihauer Film Results Sign	Positive Kleihauer: 1st BMS count: Initials: 2nd BMS count: Initials: HbF level: Initials:
Is Anti-D Required YES / NO Dose Sign Date	Ward Informed Name of Person spoken to Results read back & confirmed Date / Time Sign	

Special Requirements Notification Form

University Hospitals of Leicester NHS

BLOOD TRANSFUSION COMPONENT SPECIAL REQUIREMENTS NOTIFICATION FORM

1. FULLY COMPLETE ALL PARTS OF BOTH THE FORM AND LABEL
2. PEEL OFF THE LABEL AND PUT ON INSIDE COVER OF PATIENTS NOTES
3. SEND THE COMPLETED FORM TO BLOOD TRANSFUSION IMMEDIATELY

PATIENT'S NAME	
HOSPITAL NUMBER	
DATE OF BIRTH	

CMV Negative components required YES ☐ NO ☐

PATIENT'S CMV STATUS Positive / Negative / Pending
Donors CMV Status Positive / Negative / Pending

IRRADIATED Components required YES ☐ NO ☐

Hep E negative components required YES ☐ NO ☐

Please specify clinical indication for above requirement(s):

.....

SIGNED ..... DATE .....

PRINT NAME ..... GRADE .....

CMV Negative /Irradiated/Hep E Negative Blood Component Requirements

Patient's Name.....
Hosp Number: ..... DOB.....
Irradiated Yes / No
CMV Negative Yes / No
Hep E Negative blood Yes / No
Reason.....
Signed.....Date.....
Print Name.....

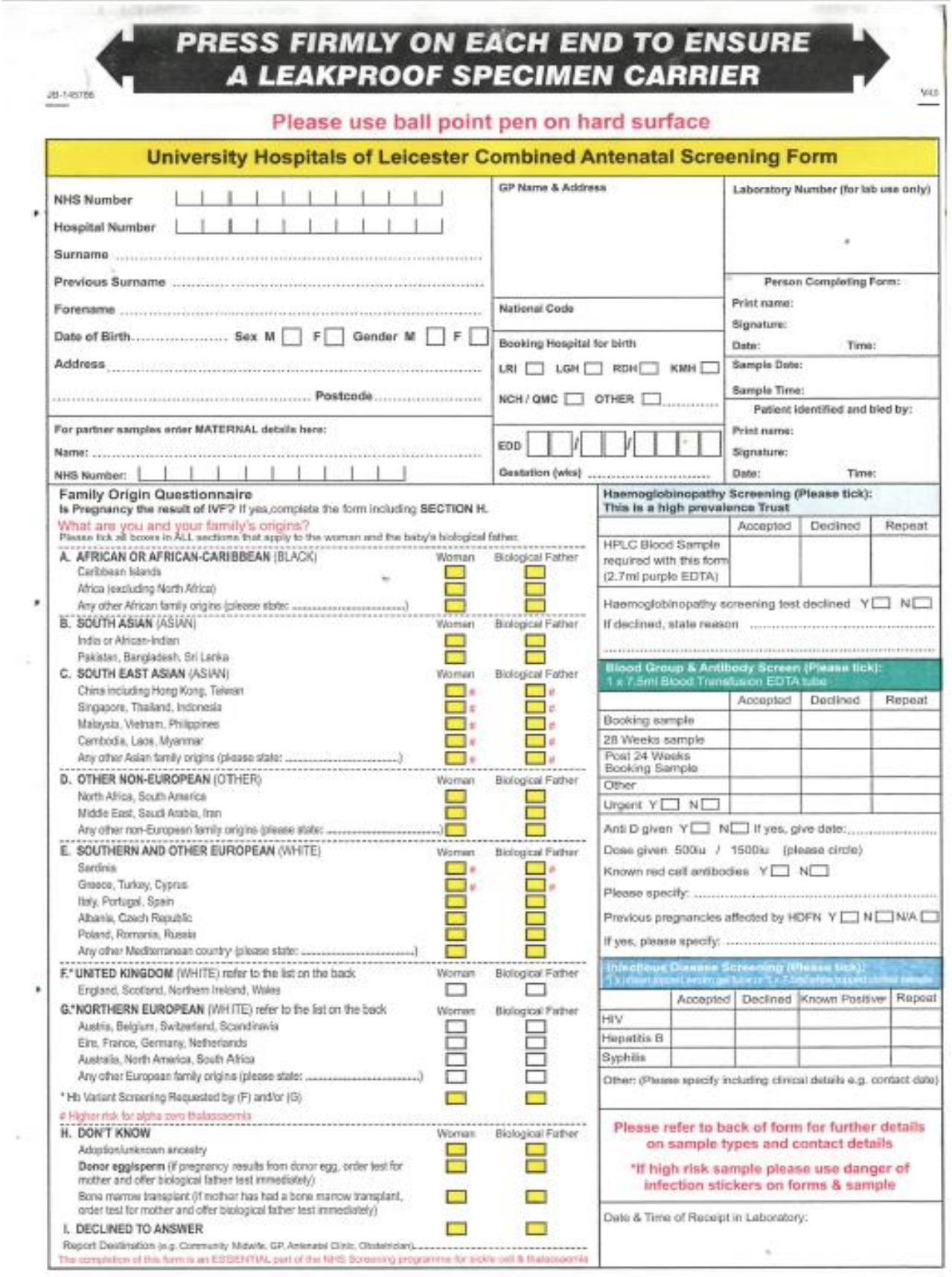
For lab use only
Entered on to patient's Winpath record
By:
Date:

Please PEEL OFF THE LABEL AND STICK ON THE INSIDE FRONT COVER OF THE PATIENT'S NOTES
This form must be hand delivered to Blood Bank.

NHSBT Request Forms

http://hospital.blood.co.uk/diagnostic-services/hi/hi-test-request-forms/

Antenatal Testing Request Form



PRESS FIRMLY ON EACH END TO ENSURE A LEAKPROOF SPECIMEN CARRIER

Please use ball point pen on hard surface

University Hospitals of Leicester Combined Antenatal Screening Form

NHS Number
Hospital Number
Surname
Previous Surname
Forename
Date of Birth ..... Sex M F Gender M F
Address
Postcode

For partner samples enter MATERNAL details here:
Name:
NHS Number:

GP Name & Address

National Code

Booking Hospital for birth
LRI LGH RDH KMH
NCH / QMC OTHER

EDD / /
Gestation (wks)

Laboratory Number (for lab use only)

Person Completing Form:
Print name:
Signature:
Date: Time:

Sample Date:
Sample Time:

Patient identified and bled by:
Print name:
Signature:
Date: Time:

Family Origin Questionnaire
Is Pregnancy the result of IVF? If yes,complete the form including SECTION H.
What are you and your family's origins?
Please tick all boxes in ALL sections that apply to the woman and the baby's biological father.

	Woman	Biological Father
A. AFRICAN OR AFRICAN-CARIBBEAN (BLACK)		
Caribbean Islands		
Africa (excluding North Africa)		
Any other African family origins (please state: .....)		
B. SOUTH ASIAN (ASIAN)		
India or African-Indian		
Pakistan, Bangladesh, Sri Lanka		
C. SOUTH EAST ASIAN (ASIAN)		
China including Hong Kong, Taiwan	#	#
Singapore, Thailand, Indonesia	#	#
Malaysia, Vietnam, Philippines	#	#
Cambodia, Laos, Myanmar	#	#
Any other Asian family origins (please state: .....)	#	#
D. OTHER NON-EUROPEAN (OTHER)		
North Africa, South America		
Middle East, Saudi Arabia, Iran		
Any other non-European family origins (please state: .....)		
E. SOUTHERN AND OTHER EUROPEAN (WHITE)		
Sardinia	#	#
Greece, Turkey, Cyprus	#	#
Italy, Portugal, Spain		
Albania, Czech Republic		
Poland, Romania, Russia		
Any other Mediterranean country (please state: .....)		
F.* UNITED KINGDOM (WHITE) refer to the list on the back		
England, Scotland, Northern Ireland, Wales		
G.*NORTHERN EUROPEAN (WHITE) refer to the list on the back		
Austria, Belgium, Switzerland, Scandinavia		
Eire, France, Germany, Netherlands		
Australia, North America, South Africa		
Any other European family origins (please state: .....)		
* Hb Variant Screening Requested by (F) and/or (G)		

Higher risk for alpha zero thalassaemia

	Woman	Biological Father
H. DON'T KNOW		
Adoption/unknown ancestry		
Donor egg/sperm (if pregnancy results from donor egg, order test for mother and offer biological father test immediately)		
Bone marrow transplant (if mother has had a bone marrow transplant, order test for mother and offer biological father test immediately)		
I. DECLINED TO ANSWER		

Report Destination (e.g. Community Midwife, GP, Antenatal Clinic, Obstetrician).....
The completion of this form is an ESSENTIAL part of the NHS Screening programme for sickle cell & thalassaemia

Haemoglobinopathy Screening (Please tick):
This is a high prevalence Trust

	Accepted	Declined	Repeat
HPLC Blood Sample required with this form (2.7ml purple EDTA)			

Haemoglobinopathy screening test declined Y N
If declined, state reason .....

Blood Group & Antibody Screen (Please tick):
1 x 7.5ml Blood Transfusion EDTA tube

	Accepted	Declined	Repeat
Booking sample			
28 Weeks sample			
Post 24 Weeks Booking Sample			
Other			
Urgent Y N			

Anti D given Y N If yes, give date:.....
Dose given 500iu / 1500iu (please circle)
Known red cell antibodies Y N
Please specify: .....
Previous pregnancies affected by HDFN Y N N/A
If yes, please specify: .....

Infectious Disease Screening (Please tick):
1 x [illegible] serum gel tube or 1 x 7.5ml white topped clotted sample

	Accepted	Declined	Known Positive	Repeat
HIV				
Hepatitis B				
Syphilis				

Other: (Please specify including clinical details e.g. contact date)

Please refer to back of form for further details on sample types and contact details

***If high risk sample please use danger of infection stickers on forms & sample**

Date & Time of Receipt in Laboratory:

Sample Identification

The laboratory will not test samples unless four or more identical points of identification are used on forms and ALL samples. Patient information may be checked against the national spine to confirm identity.

For example:

1. Patient's first name **and** surname, initials are not sufficient.
2. NHS Number/Hospital number
3. Date of Birth
4. First line of address may be used if NHS number is not available.

- Samples should be labelled, dated and signed by the person taking them, who should complete the final section of the form.
- Pre-printed demographic labels are NOT acceptable on BLOOD TRANSFUSION sample bottles
- Samples **must** be fresh enough to allow testing within 7 days of venepuncture

Infection risk samples MUST be marked as such on both sample and form

User Handbooks

For ALL information relating to Infectious Diseases samples and enquires please use the following website link;
https://www.leicestershospitals.nhs.uk/aboutus/departments-services/pathology/clinical-microbiology/handbook/

For ALL information relating to Haemoglobinopathy, Blood Group and Antibody screening samples and enquires please use the following website link;
https://www.leicestershospitals.nhs.uk/aboutus/departments-services/pathology/blood-sciences-haematology/

PEEL TEAR AT PERFORATIONS

EASY OPENING, PLEASE TEAR AT EDGES

Sample Requirements

Blood Group & Antibody Screening:	1 x 7.5ml Blood Transfusion EDTA
Infectious Disease Screening:	1 x brown topped serum tube or 1 x 7.5ml white topped clotted sample
Haemoglobinopathy Screening:	1 x 2.7ml EDTA (Purple top) Send a separate request form and sample (4.9ml EDTA) for FBC

Frequency of Blood Group and Antibody Screening Samples Required

• Routine antenatal screening:	Booking and 28 weeks gestation.
• Patients with Anti-D, Anti-c or Anti-K:	Monthly to 28 weeks then two weekly to term **or as requested on the report.**
• Patients with other clinically significant antibodies:	Booking and 28 weeks **or as requested on the report.**

Infectious Disease Screening

- This sample will be tested on the basis that the patient has been informed of, and agrees to, all the tests required.
- National guidelines recommend that tests are performed once in the pregnancy, preferably at booking, for syphilis, hepatitis B and HIV. However, these tests can be performed at any time and should be offered at 28 weeks if the woman declines testing at booking.
- For late booking blood, or patients suspected of seroconversion during pregnancy, please tick the relevant boxes on the front of the form.
- For patients that have been in contact with chicken pox or suspected rubella, please contact the Microbiology/ Virology laboratory at LRI for advice 0116 258 6522.

LDPE

BIOHAZARD

Haemoglobinopathy Screening

- United Kingdom (white): England, Scotland, Northern Ireland, Wales.
- Northern European (white): Austria, Belgium, Denmark, Greenland, Iceland, Ireland (Eire), Finland, France, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland.
  Northern European origin (white): Australia, North America (USA, Canada), South Africa, New Zealand.
- Some populations of the following countries have Northern European origin (countries listed above) and are also at low risk for haemoglobin variants:

Special Haematology Laboratory Telephone No. 0116 2587531

Contact the Antenatal Screening Laboratory

Pathology, Level 2 Sandringham Building, Leicester Royal Infirmary, Infirmary Square, Leicester, LE1 5WW

Routine Hours:- Mon - Fri 09:00 - 17:00 Laboratory Failsafe Team Tel: 0116 204 7944

Forms and Supplies can be obtained from Pathology Stores at UHL
TEL: 0116 258 6597 or 0116 258 5968
Email: pathology.stores@uhl-tr.nhs.uk

Emergency "Flying Squad" Form 1

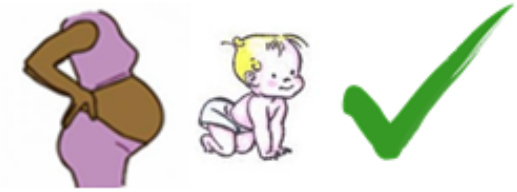
UNCROSSMATCHED

Emergency O RhD Negative Blood

For EMERGENCIES only & at the discretion of medical staff

CONTACT BLOOD TRANSFUSION IMMEDIATELY WHEN REMOVED FROM FRIDGE

SUITABLE FOR **ALL** PATIENTS **INCLUDING** NEONATAL AND ANTENATAL PATIENTS



Unit Number					
Expiry Date					
Confirm:	**rr** YES / NO	**K neg**	YES / NO	**CMV neg**	YES / NO
Date and time released					
Blood fridge location		**BMS Initials**			

ON TRANSFUSION PLEASE:

4. FULLY COMPLETE ALL PARTS OF BOTH THE FORM AND LABEL BELOW.
5. PEEL OFF THE LABEL AND STICK IT IN THE PATIENT'S NOTES
6. SEND THE COMPLETED FORM TO BLOOD TRANSFUSION WITHOUT DELAY

TRANSFUSED TO

Name	
Hospital number	
DOB	
Date and time used	
Prescribing doctor	
Administered by	

Emergency O neg Blood Transfused	
Bag Number	
Patient's Name	
Hospital number	
Date/ time used	
Prescribing Dr.	
1st checker sig & print name	
2nd checker sig & print name	

PEEL HERE

WASTED.

If none given tick here. ☐

PEEL OFF THE LABEL AND STICK IT IN THE PATIENT'S NOTES

FOR LAB USE ONLY
Entered into W inpath
Sign/Date

Emergency "Flying Squad" Form 2

UNCROSSMATCHED
Emergency O RhD Negative Blood

For EMERGENCIES only & at the discretion of medical staff

CONTACT BLOOD TRANSFUSION IMMEDIATELY WHEN REMOVED FROM FRIDGE

NOT SUITABLE FOR NEONATAL AND ANTENATAL PATIENTS

NOT CMV NEG

Unit Number					
Expiry Date					
Confirm:	rr YES / NO	**K neg** YES / NO		**CMV neg** YES / NO	
Date and time released					
Blood fridge location			**BMS Initials**		

ON TRANSFUSION PLEASE:

1. FULLY COMPLETE ALL PARTS OF BOTH THE FORM AND LABEL BELOW.
2. PEEL OFF THE LABEL AND STICK IT IN THE PATIENT'S NOTES
3. SEND THE COMPLETED FORM TO BLOOD TRANSFUSION WITHOUT DELAY

TRANSFUSED TO

Name	
Hospital number	
DOB	
Date and time used	
Prescribing doctor	
Administered by	

Emergency O neg Blood Transfused	
Bag Number	
Patient's Name	
Hospital number	
Date/ time used	
Prescribing Dr.	
1st checker sig & print name	
2nd checker sig & print name	

PEEL HERE

WASTED.

If none given tick here. ☐

PEEL OFF THE LABEL AND STICK IT IN THE PATIENT'S NOTES

FOR LAB USE ONLY
Entered into W inpath
Sign/Date

Special Haematology

Haemostasis

Haemostasis & Thrombosis Request Form — Special Haematology and HMDL

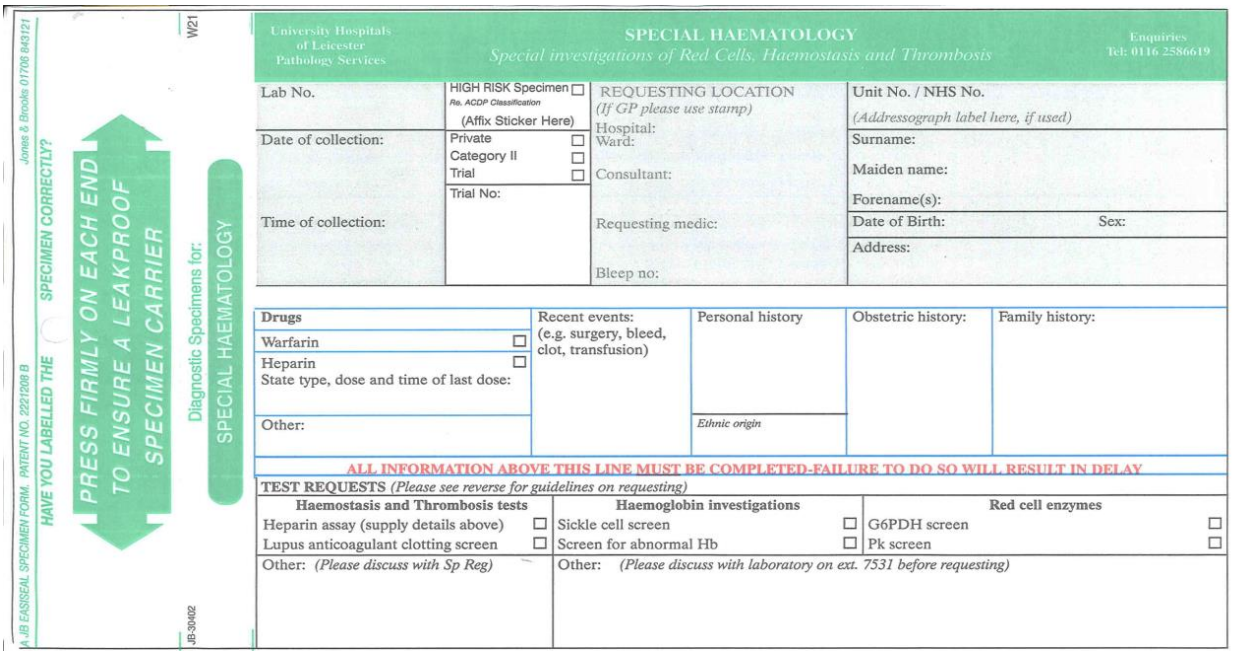
Patient Details	**DATE & TIME RECEIVED:**
UNIT No.	Hospital:
SURNAME:	Department:
FORENAME:	Consultant:
ADDRESS:	Requesting Medic:
	State if urgent or if results required by specific
D.O.B.	
GENDER:	**For drug/factor assay: tick drug/dose/time/date**
Related to:-	Dalteparin / Rivaroxaban
Clinical Details:	Apixaban / Edoxaban
	Dabigatran / TIME Given
Sample Type (P.T.O.) Date: Time:	Factor conc / DATE Given

Bleeding Disorders					
	√	result		√	result
PT			F VIII		
APTT FS			F IX		
APTT FS 50/50			F XI		
APTT LA			F XII		
APTT LA 50/50			F II		
TCT			F V		
Fibrinogen (Clauss)			F VII		
Fibrinogen (Ag)			F X		
VWD screen			Platelet Function		
vWF Antigen			F XIII Screen		
vWF CBA			Inhibitor Screen		
vWF Rcof			Inhibitor Assay		

Thrombotic Disorders					
	√	result		√	result
Antithrombin			Protein S Free		
Protein C					
Lupus Screen					

Misc./Comment

Haemoglobinopathies - General



PRESS FIRMLY ON EACH END TO ENSURE A LEAKPROOF SPECIMEN CARRIER

HAVE YOU LABELLED THE SPECIMEN CORRECTLY?

Diagnostic Specimens for: SPECIAL HAEMATOLOGY

University Hospitals of Leicester Pathology Services

SPECIAL HAEMATOLOGY
Special investigations of Red Cells, Haemostasis and Thrombosis

Enquiries Tel: 0116 2586619

Lab No. | HIGH RISK Specimen ☐ Re. ACDP Classification | (Affix Sticker Here) | REQUESTING LOCATION (If GP please use stamp) | Unit No. / NHS No. (Addressograph label here, if used)

Date of collection: | Private ☐ Category II ☐ Trial ☐ | Trial No: | Hospital: Ward: Consultant: | Surname: Maiden name: Forename(s):

Time of collection: | Requesting medic: Bleep no: | Date of Birth: Sex: Address:

Drugs	Recent events: (e.g. surgery, bleed, clot, transfusion)	Personal history	Obstetric history:	Family history:
Warfarin ☐				
Heparin ☐ State type, dose and time of last dose:				
Other:		Ethnic origin		

ALL INFORMATION ABOVE THIS LINE MUST BE COMPLETED-FAILURE TO DO SO WILL RESULT IN DELAY

TEST REQUESTS *(Please see reverse for guidelines on requesting)*

Haemostasis and Thrombosis tests	Haemoglobin investigations	Red cell enzymes
Heparin assay (supply details above) ☐	Sickle cell screen ☐	G6PDH screen ☐
Lupus anticoagulant clotting screen ☐	Screen for abnormal Hb ☐	Pk screen ☐
Other: *(Please discuss with Sp Reg)*	Other: *(Please discuss with laboratory on ext. 7531 before requesting)*	

Haemoglobinopathies – Antenatal Screening

Antenatal Haemoglobinopathy screening request only | Special Haematology

University Hospitals of Leicester NHS
NHS Trust

High Prevalence Trust
Laboratory sample number

MATERNAL DETAILS

Hospital No .....
NHS No .....
Surname .....
Forename .....
Date of Birth ..... / ..... / .....
Address .....
.....
.....
EDD ..... / ..... / .....

Infection risk?
☐ Yes ☐ No

Gestation at screening ..... wks

Laboratory Tel No: 0116 258 7531

Is this request Urgent? ☐
Consultant .....
Booking Hospital .....
GP (practice stamp) .....
Name .....
Address .....
.....
Tel No .....
Person completing this form (Print) .....
Person taking this sample (Print) .....
Date and time of sample collection
..... / ..... / ..... at .....

HPLC blood sample required with this form
2.7ml venous blood in Purple top EDTA bottle

FBC - Send separate request form and sample
4.9ml venous blood in Red top EDTA bottle

Date and time of receipt in laboratory
.....

Family Origin Questionnaire

Please tick ALL sections that apply to the woman and the baby's father

What are your family origins?

	Woman	Baby's father
A. AFRICAN-CARIBBEAN (BLACK)		
Caribbean Islands	☐	☐
Africa (excluding North Africa)	☐	☐
Any other African or African-Caribbean family origins (please write in...)		
B. SOUTH ASIAN (ASIAN)	Woman	Baby's father
India or African-Indian	☐	☐
Pakistan, Bangladesh	☐	☐
Sri Lanka	☐	☐
C. SOUTH EAST ASIAN (ASIAN)	Woman	Baby's father
China including Hong Kong, Taiwan, Singapore	☐ #	☐ #
Thailand, Indonesia, Burma,	☐ #	☐ #
Malaysia, Vietnam, Philippines, Cambodia, Laos	☐ #	☐ #
Any other Asian family origins (please write in... e.g. Caribbean-Asian)		
D. OTHER NON-EUROPEAN (OTHER)	Woman	Baby's father
North Africa, South America etc	☐	☐
Middle East (Saudi Arabia, Iran etc)	☐	☐
Any other Non-European family origins (please write in...)		
E. SOUTHERN & OTHER EUROPEAN (WHITE)	Woman	Baby's father
Sardinia	☐ #	☐ #
Greece, Turkey, Cyprus	☐ #	☐ #
Italy, Portugal, Spain	☐	☐
Any other Mediterranean country	☐	☐
Albania, Czech Republic, Poland, Romania, Russia etc	☐	☐
F. UNITED KINGDOM (WHITE)	Woman	Baby's father
England, Scotland, N Ireland, Wales	☐	☐
G. NORTHERN EUROPEAN (WHITE)	Woman	Baby's father
Austria, Belgium, Ireland, France, Germany, Netherlands	☐	☐
Scandinavia, Switzerland etc	☐	☐
Any other European family origins, (Please write in... e.g. Australia, N America, South Africa)		
# Higher risk for alpha zero thalassaemia		
H. DON'T KNOW	Woman	Baby's father
adoption/unknown ancestry	☐	☐
donor egg/sperm	☐	☐
bone marrow transplant	☐	☐

I. DECLINED TO ANSWER ☐

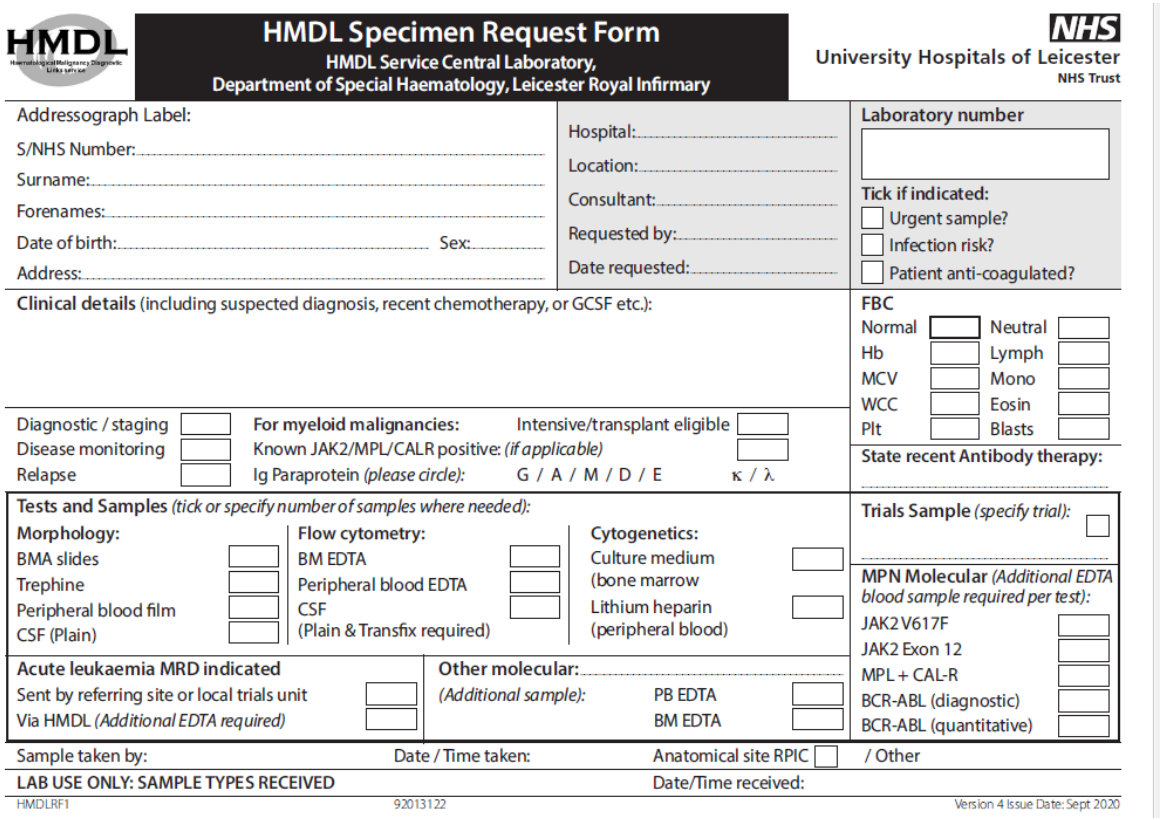
SCREENING TEST DECLINED *Do you want to give a reason why declined?*

☐ Yes .....
☐ No

Top copy of this form must be sent securely with sample to Special Haematology Laboratory
Bottom copy of this form filed in hand held notes
The completion of this form is an ESSENTIAL part of the screening programme for sickle cell & thalassaemia

Version No. FOGRV2010914

HMDL Form



HMDL Specimen Request Form
HMDL Service Central Laboratory,
Department of Special Haematology, Leicester Royal Infirmary

NHS University Hospitals of Leicester NHS Trust

Addressograph Label:
S/NHS Number:
Surname:
Forenames:
Date of birth: Sex:
Address:

Hospital:
Location:
Consultant:
Requested by:
Date requested:

Laboratory number

Tick if indicated:
- Urgent sample?
- Infection risk?
- Patient anti-coagulated?

Clinical details (including suspected diagnosis, recent chemotherapy, or GCSF etc.):

FBC
Normal | Neutral
Hb | Lymph
MCV | Mono
WCC | Eosin
Plt | Blasts

Diagnostic / staging
Disease monitoring
Relapse

For myeloid malignancies:
Intensive/transplant eligible
Known JAK2/MPL/CALR positive: *(if applicable)*
Ig Paraprotein *(please circle)*: G / A / M / D / E κ / λ

State recent Antibody therapy:

Tests and Samples *(tick or specify number of samples where needed)*:

Morphology:
BMA slides
Trephine
Peripheral blood film
CSF (Plain)

Flow cytometry:
BM EDTA
Peripheral blood EDTA
CSF (Plain & Transfix required)

Cytogenetics:
Culture medium (bone marrow
Lithium heparin (peripheral blood)

Trials Sample *(specify trial)*:

MPN Molecular *(Additional EDTA blood sample required per test)*:
JAK2 V617F
JAK2 Exon 12
MPL + CAL-R
BCR-ABL (diagnostic)
BCR-ABL (quantitative)

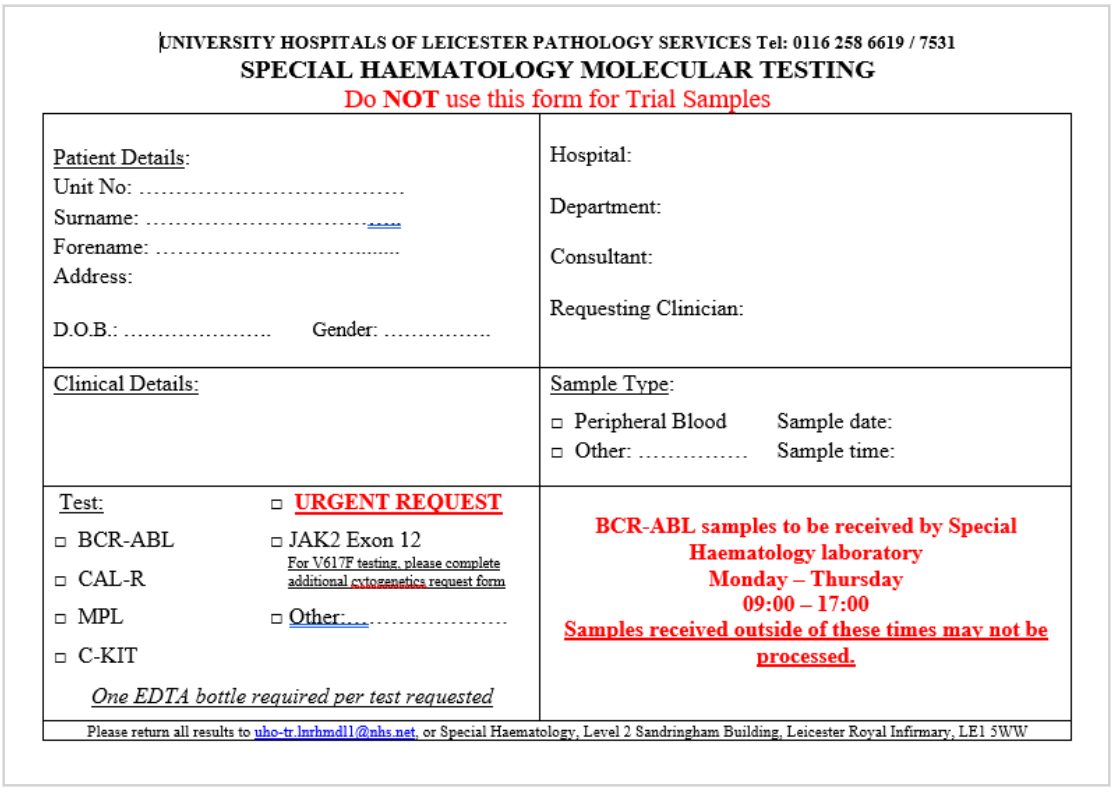
Acute leukaemia MRD indicated
Sent by referring site or local trials unit
Via HMDL *(Additional EDTA required)*

Other molecular:
(Additional sample): PB EDTA / BM EDTA

Sample taken by: Date / Time taken: Anatomical site RPIC / Other

LAB USE ONLY: SAMPLE TYPES RECEIVED Date/Time received:

HMDLRF1 92013122 Version 4 Issue Date: Sept 2020



UNIVERSITY HOSPITALS OF LEICESTER PATHOLOGY SERVICES Tel: 0116 258 6619 / 7531

SPECIAL HAEMATOLOGY MOLECULAR TESTING

Do **NOT** use this form for Trial Samples

Patient Details:
Unit No: .....
Surname: .....
Forename: .....
Address:

D.O.B.: ..... Gender: .....

Hospital:

Department:

Consultant:

Requesting Clinician:

Clinical Details:

Sample Type:
- ☐ Peripheral Blood — Sample date:
- ☐ Other: ..... — Sample time:

Test:
- ☐ BCR-ABL
- ☐ CAL-R
- ☐ MPL
- ☐ C-KIT
- ☐ **URGENT REQUEST**
- ☐ JAK2 Exon 12 — For V617F testing, please complete additional cytogenetics request form
- ☐ Other:.....

One EDTA bottle required per test requested

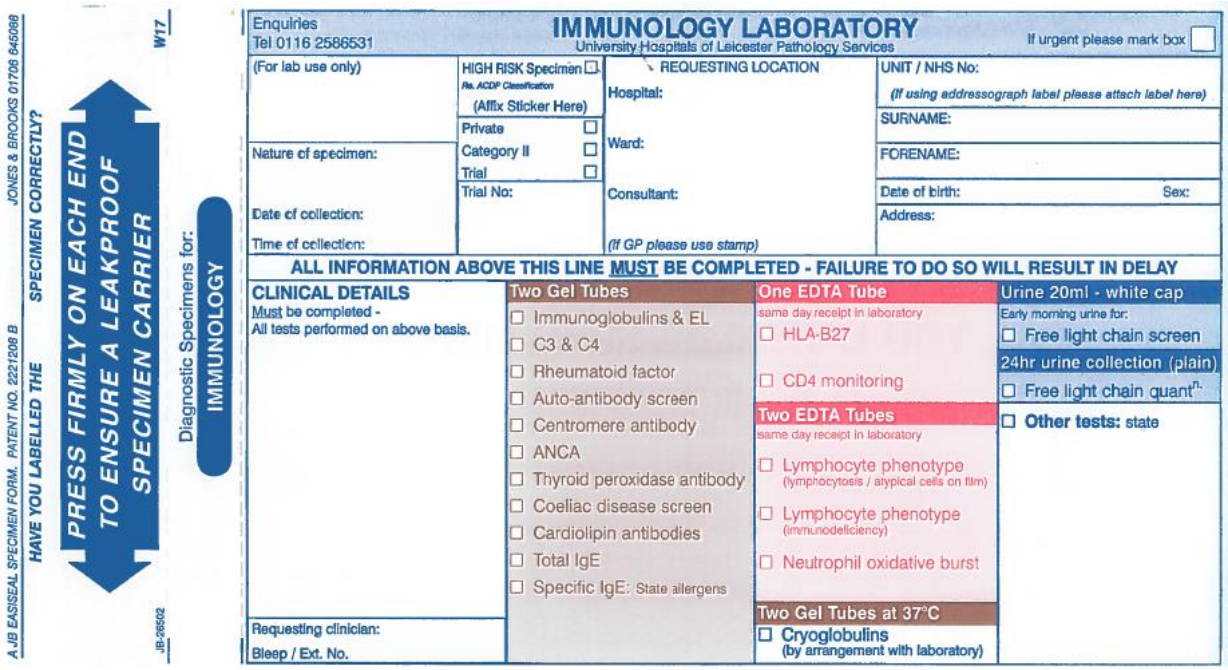
BCR-ABL samples to be received by Special Haematology laboratory
Monday – Thursday
09:00 – 17:00
Samples received outside of these times may not be processed.

Please return all results to uho-tr.lnrhmdl1@nhs.net, or Special Haematology, Level 2 Sandringham Building, Leicester Royal Infirmary, LE1 5WW

MRD TESTING SITES

CML: BCR-abl **1** Hammersmith Hospital MRD Leukaemia Unit Imperial College School of Medicine Ducane Road London W12 0NN	**APML (diagnostic samples and MRD)** **2** Molecular Oncology Diagnostics Unit Clinical Laboratory Services 4th Floor, Southwark Wing Guy's Hospital Great Maze Pond London SE1 9RT
VNTR/STR (post transplant) **3** The Transplant Laboratory Manchester Royal Infirmary Oxford Road Manchester M13 9WL	**Children with APML** **4** North Trent Molecular Genetics Sheffield Children's Hospital Western Bank Sheffield S10 2TH
VNTR (post transplant) Aplastic Anaemia **5** West Midlands Regional Genetics Lab. Birmingham Women's Health Care Trust Edgbaston B15 2TG	**MRD other than APML** **6** Prof. J A L Yin Department of Haematology Manchester Royal Infirmary Oxford Road Manchester M13 9WL

Immunology



PRESS FIRMLY ON EACH END TO ENSURE A LEAKPROOF SPECIMEN CARRIER
HAVE YOU LABELLED THE SPECIMEN CORRECTLY?
JONES & BROOKS 01706 645098
A JB EASISEAL SPECIMEN FORM. PATENT NO. 2221208 B
W17
JB-26502
Diagnostic Specimens for: IMMUNOLOGY

Enquiries
Tel 0116 2586531

IMMUNOLOGY LABORATORY
University Hospitals of Leicester Pathology Services

If urgent please mark box ☐

(For lab use only)
HIGH RISK Specimen ☐
Re. ACDP Classification
(Affix Sticker Here)
Private ☐
Category II ☐
Trial ☐
Trial No:
Nature of specimen:
Date of collection:
Time of collection:

REQUESTING LOCATION
Hospital:
Ward:
Consultant:
(If GP please use stamp)

UNIT / NHS No:
(If using addressograph label please attach label here)
SURNAME:
FORENAME:
Date of birth: Sex:
Address:

ALL INFORMATION ABOVE THIS LINE MUST BE COMPLETED - FAILURE TO DO SO WILL RESULT IN DELAY

CLINICAL DETAILS
Must be completed -
All tests performed on above basis.

Requesting clinician:
Bleep / Ext. No.

Two Gel Tubes
- ☐ Immunoglobulins & EL
- ☐ C3 & C4
- ☐ Rheumatoid factor
- ☐ Auto-antibody screen
- ☐ Centromere antibody
- ☐ ANCA
- ☐ Thyroid peroxidase antibody
- ☐ Coeliac disease screen
- ☐ Cardiolipin antibodies
- ☐ Total IgE
- ☐ Specific IgE: State allergens

One EDTA Tube
same day receipt in laboratory
- ☐ HLA-B27
- ☐ CD4 monitoring

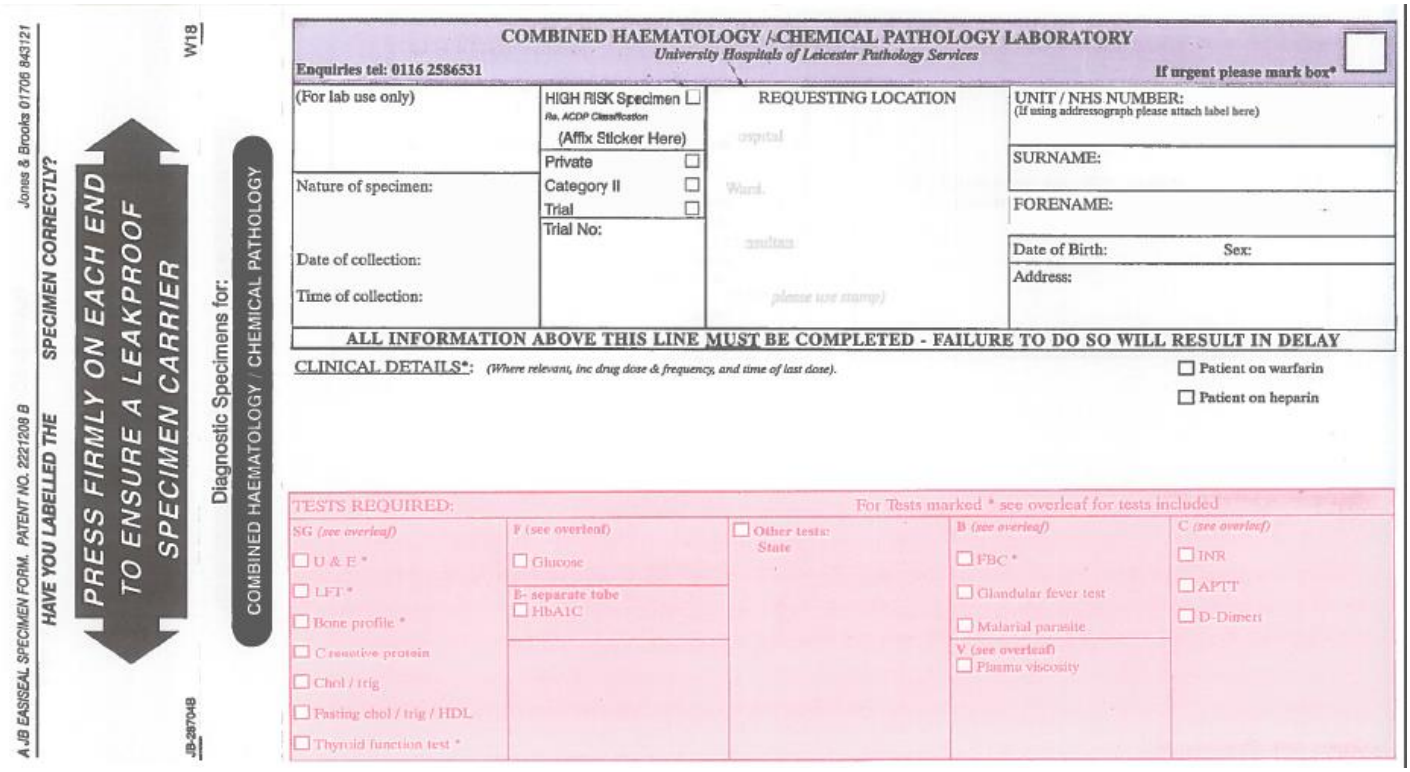
Two EDTA Tubes
same day receipt in laboratory
- ☐ Lymphocyte phenotype (lymphocytosis / atypical cells on film)
- ☐ Lymphocyte phenotype (immunodeficiency)
- ☐ Neutrophil oxidative burst

Two Gel Tubes at 37°C
- ☐ Cryoglobulins (by arrangement with laboratory)

Urine 20ml - white cap
Early morning urine for:
- ☐ Free light chain screen

24hr urine collection (plain)
- ☐ Free light chain quantn.
- ☐ **Other tests:** state

Routine Haematology & Chemistry



A JB EASISEAL SPECIMEN FORM. PATENT NO. 2221208 B Jones & Brooks 01706 843121

HAVE YOU LABELLED THE SPECIMEN CORRECTLY?

PRESS FIRMLY ON EACH END TO ENSURE A LEAKPROOF SPECIMEN CARRIER

W18

Diagnostic Specimens for: COMBINED HAEMATOLOGY / CHEMICAL PATHOLOGY

JB-287048

COMBINED HAEMATOLOGY /-CHEMICAL PATHOLOGY LABORATORY

University Hospitals of Leicester Pathology Services

Enquiries tel: 0116 2586531 — If urgent please mark box*

(For lab use only) | HIGH RISK Specimen ☐ Re. ACDP Classification | (Affix Sticker Here) | REQUESTING LOCATION | UNIT / NHS NUMBER: (If using addressograph please attach label here)

Private ☐ Category II ☐ Trial ☐ Trial No:

Nature of specimen:

Date of collection:

Time of collection:

SURNAME:

FORENAME:

Date of Birth: Sex:

Address:

ALL INFORMATION ABOVE THIS LINE MUST BE COMPLETED - FAILURE TO DO SO WILL RESULT IN DELAY

CLINICAL DETAILS*: *(Where relevant, inc drug dose & frequency, and time of last dose).*

☐ Patient on warfarin

☐ Patient on heparin

TESTS REQUIRED: For Tests marked * see overleaf for tests included

SG *(see overleaf)*: ☐ U & E * ☐ LFT * ☐ Bone profile * ☐ C reactive protein ☐ Chol / trig ☐ Fasting chol / trig / HDL ☐ Thyroid function test *

F *(see overleaf)*: ☐ Glucose

E- separate tube: ☐ HbA1C

☐ Other tests: State

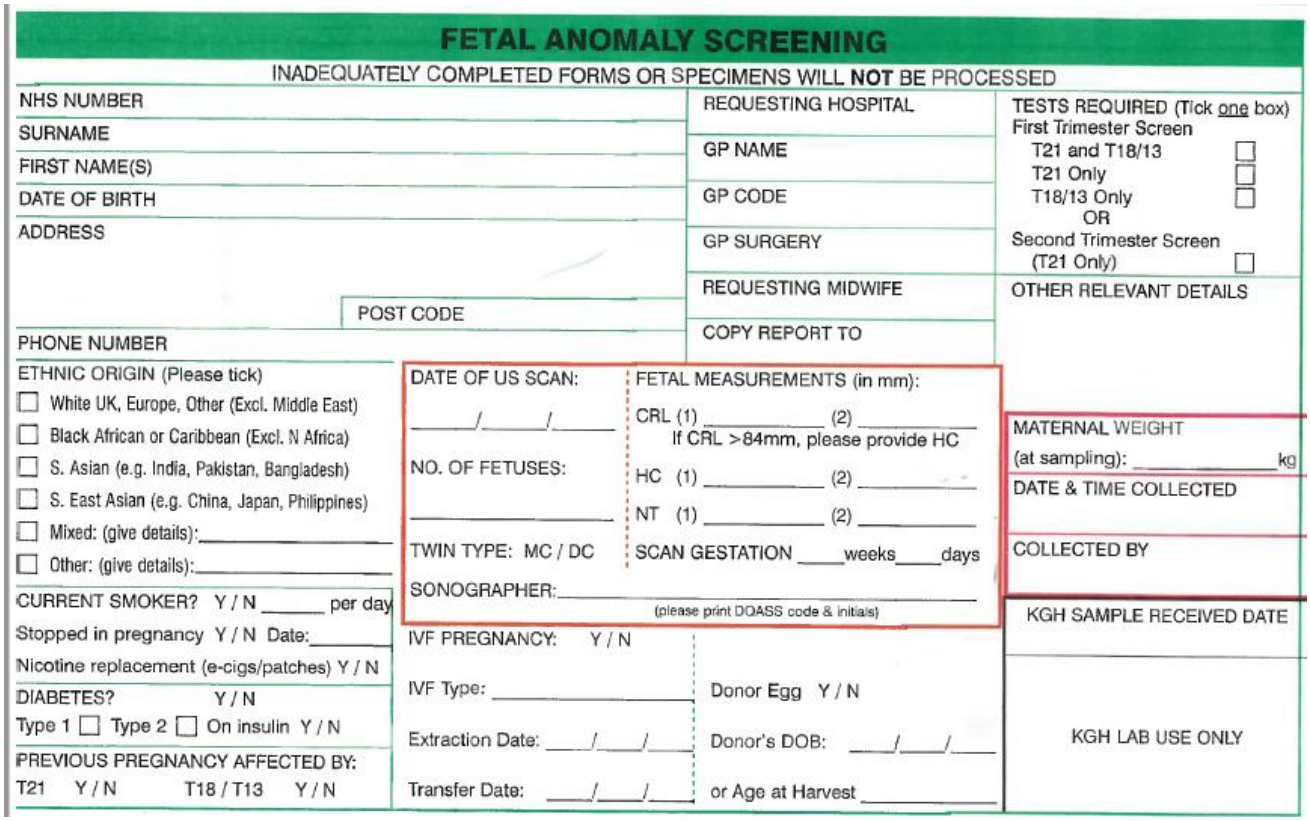
B *(see overleaf)*: ☐ FBC * ☐ Glandular fever test ☐ Malarial parasite

V *(see overleaf)*: ☐ Plasma viscosity

C *(see overleaf)*: ☐ INR ☐ APTT ☐ D-Dimer

Routine Chemistry

Fetal Anomaly Screening request form for analysis at Kettering General Hospital



FETAL ANOMALY SCREENING

INADEQUATELY COMPLETED FORMS OR SPECIMENS WILL **NOT** BE PROCESSED

NHS NUMBER
SURNAME
FIRST NAME(S)
DATE OF BIRTH
ADDRESS
POST CODE
PHONE NUMBER

REQUESTING HOSPITAL
GP NAME
GP CODE
GP SURGERY
REQUESTING MIDWIFE
COPY REPORT TO

TESTS REQUIRED (Tick one box)
First Trimester Screen
T21 and T18/13 ☐
T21 Only ☐
T18/13 Only ☐
OR
Second Trimester Screen
(T21 Only) ☐

OTHER RELEVANT DETAILS

ETHNIC ORIGIN (Please tick)
☐ White UK, Europe, Other (Excl. Middle East)
☐ Black African or Caribbean (Excl. N Africa)
☐ S. Asian (e.g. India, Pakistan, Bangladesh)
☐ S. East Asian (e.g. China, Japan, Philippines)
☐ Mixed: (give details):_____
☐ Other: (give details):_____

CURRENT SMOKER? Y / N _____ per day
Stopped in pregnancy Y / N Date:_____
Nicotine replacement (e-cigs/patches) Y / N

DIABETES? Y / N
Type 1 ☐ Type 2 ☐ On insulin Y / N

PREVIOUS PREGNANCY AFFECTED BY:
T21 Y / N T18 / T13 Y / N

DATE OF US SCAN: ____/____/____
NO. OF FETUSES: _____
TWIN TYPE: MC / DC
SONOGRAPHER:_____
(please print DOASS code & initials)

FETAL MEASUREMENTS (in mm):
CRL (1) _____ (2) _____
If CRL >84mm, please provide HC
HC (1) _____ (2) _____
NT (1) _____ (2) _____
SCAN GESTATION ____weeks____days

IVF PREGNANCY: Y / N
IVF Type: _____
Extraction Date: ____/____/____
Transfer Date: ____/____/____

Donor Egg Y / N
Donor's DOB: ____/____/____
or Age at Harvest _____

MATERNAL WEIGHT
(at sampling): _____kg
DATE & TIME COLLECTED
COLLECTED BY

KGH SAMPLE RECEIVED DATE

KGH LAB USE ONLY

Appendix 4: Pre-Transfusion Sample Requirements

There are strict guidelines in place regarding the frequency of transfusion samples due to the potential risk of transfusion complications, including development of significant antibodies. Although this risk can never be entirely removed, the laboratory has implemented the following requirements to mitigate this risk as much as possible:

- The '2 sample' policy states that blood products will not be released from the laboratory until 2 separate samples from the patient have been received. The blood group of both samples are compared and, if identical, blood may be electronically crossmatched if appropriate. If not concordant, a third sample will be requested immediately.
  - Group and screen samples are **ONLY** valid for 72 hours **UNLESS** the plasma has been frozen **OR** they are multi-transfused Haematology patients whose samples are valid for 96 hours.
  - Freezing the plasma extends the sample validity up to 3 months
  - Sample validity **MUST NOT** be extended by freezing the sample if the patient has current OR historical antibodies – Because the status of the patient's antibody(s) can change during this period of freezing a 'fresh' sample is required to ensure we check the antibody status again as close to the planned transfusion as possible. Using the frozen sample would not capture any potential changes in antibody status.
  - Sample validity **MUST NOT** be extended by freezing if the patient has been pregnant in the last 3 months – Because the patient may have developed an antibody during pregnancy
  - Sample validity **MUST NOT** be extended by freezing if the patient has had a transfusion in the last 3 months – Because the patient may have developed an antibody through the transfusion
  - The **responsibility** for ensuring the last 2 points are adhered to lies with the requesting Clinician to ensure that the patient has no previous history

Patients who WILL have plasma frozen:

- Patients where the request for a blood transfusion is more than 72 hours in advance, who are **NOT** pregnant and who have **NOT** had a transfusion in the last 3 months
- All 'pre operative' group and screen samples from patients who are **NOT** pregnant and who have **NOT** had a transfusion in the last 3 months

ALL samples **EXCEPT** the following 4 categories **will** have a frozen plasma sample:

- Samples from Maternity wards, or patients that have been pregnant in the last 3 months
- Samples from Haematology wards, Oncology wards and BMTU
- Patients with antibodies
- Patients who have been transfused in the last 3 months

Appendix 5: Provision of Blood Products

The following blood products may be requested using the 'Routine' blood transfusion request form:

- Red blood cells
- Platelets*
- Fresh frozen plasma / Octaplas*
- Cryoprecipitate*
- Human albumin solution (4.5% and 20%)
- Prothrombin Complex Concentrate (Only available following discussion with Haematology SpR/Consultant. Accompanying documentation and audit forms must be completed and returned to Blood Bank. The PCC Clinician pack is available on UHL Connect). NB: Unused product must be returned to blood bank within 2 hours
- Novoseven (Only available following discussion with Haematology SpR/Consultant. Can be issued on receipt of transfusion fluids form following telephone requests) NB: Unused product must be returned to blood bank within 2 hours

**Specialist product requests will only be processed following discussion with the Haematology SpR/Consultant, as part of the major haemorrhage protocol, following a TEG (thromboelastogram) result, or for peri- and immediate post-operative cardiothoracic patients.*

Urgent Red Cell Issue

An urgent red cell crossmatch, given the maximum priority takes about 40 minutes from receipt of the sample in the laboratory, providing no red cell antibodies are detected. If antibodies are found, this will lead to delays in providing compatible blood. The extent of delay depends upon the nature of antibody(ies) and the availability of suitable blood (including accommodating any special requirements).

Group specific blood (ABO compatible – uncrossmatched) can be issued in emergencies within 20 minutes of receiving samples. This is only appropriate for patients who are experiencing life-threatening bleeding who cannot wait for crossmatched blood and as such is usually reserved for activation of major haemorrhage protocol.

Emergency O D negative red cells

Units of O D negative (rr), K negative adult red cells are available at all times in selected issue fridges for use in clinical emergencies. The units supplied to delivery suites are also CMV negative for neonates and women during pregnancy. Such units can be found in the following locations:

Location	Number of Emergency Adult Units - O D Neg (rr) K negative
LRI Issue fridge	**2**
LRI ED	**4**
LRI Theatres	**2**
LRI Delivery Suite	**2** units are also CMV neg for transfusion to neonates women during pregnancy
LRI Haematology Day Ward (not for overnight storage)	0

LGH Issue Fridge	**2**
LGH Delivery Suite	**2** units are also CMV neg for transfusion to neonates women during pregnancy
LGH Main Theatre reception (not for overnight storage)	0
LGH Orthopaedic theatres (not for overnight storage)	0
GH Issue Fridge	**2**
GH CICU	**6**
GH Cardiac Theatres 1 & 2 (not for overnight storage)	0

The laboratory must be informed immediately if any O negative blood is removed for transfusion as stock **must be immediately replaced** for any other patient who may require emergency support.

The forms included with the blood (appendix 3) must be fully completed and returned to the Blood Transfusion Laboratory without delay. The sticker on the form must also be fully completed and placed in the patient notes.

Patient Waiting

When there is a patient waiting for a transfusion, requests will be prioritised for processing within 2 hours from receipt of sample providing no red cell antibodies are detected. The laboratory must be informed that the patient is waiting for a transfusion.

Anti-D Issue

With the exception of 28 week gestation prophylaxis, all samples will have a kleihauer test performed to determine the appropriate anti-D dose. Anti-D can be requested from the Blood Bank using the 'Kleihauer' form (see appendix 3).

Retrospective issue of 28 week gestation anti-D must be requested using the K28 receipt form

The ward Anti-D Immunoglobulin Pathway must be completed for traceability (a legal requirement) and replacement of stock.

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Appendix 6: Blood Product Special Requirements

Products can be requested to be irradiated and/or CMV negative, depending upon the clinical scenario and urgency of transfusion. Even if no requirements are required, this MUST be indicated on the routine request form.

When first identifying the need for a special requirement on a blood product request, a 'Special Requirements Notification' form (appendix 3) MUST also be provided.

Gamma Irradiated blood components

Gamma irradiated products are provided to reduce the risk of Graft versus Host Disease (GvHD). Irradiated products are indicated in the following scenarios:

- Recipients of allogeneic bone marrow and PBSC transplant
- Allogeneic bone marrow or PBSC donors
- Recipients of autologous bone marrow and PBSC transplants
- Hodgkin's disease (any stage)
- Recipients of Fludarabine, Clofarabine, Cladribine, Nelarabine, Deoxycoformycin (DCF, Pentostatin), Campath (Alemtuzumab) and anti- Thymocyte Globulin (ATG)
- Intrauterine transfusions (IUT) of red cells or platelets
- All exchange transfusions for neonates and infants
- HLA Matched platelets and red cell, platelets or granulocyte donations from first or second degree relatives
- Granulocytes on all occasions. Transfuse immediately after irradiation.
- Congenital immunodeficiency states
    1. Severe combined immunodeficiency (SCID)
    2. Di George syndrome
    3. Wiskott Aldrich syndrome
    4. Reticular dysgenesis
    5. Cellular immunodeficiency states, otherwise unclassified
    6. Immunodeficiency with eosinophilia (Omenn's syndrome)
    7. Ataxia telangiectasia
    8. Adenosine deaminase deficiency
    9. Purine nucleoside phosphorylase deficiency
    10. MHC class I or II deficiency
    11. Leucocyte adhesion deficiency

CMV Seronegative blood components

Cytomegalovirus (CMV) negative products are provided for patients at increased risk of serious consequences of CMV infection. However, they may not be provided if the clinical urgency is such that provision of CMV Seronegative blood is likely to cause unacceptable delay. Indications for CMV negative products include:

- Neonates or infant up to 28 days old. For premature neonates, count 28 days cut off from their expected date of delivery
- All Intrauterine transfusions
- Planned transfusions during pregnancy, wherever clinically possible (Not necessary during or post delivery)
- CMV negative recipients of allogeneic bone marrow and/or peripheral blood stem cell transplants.
- Specific CMV-negative paediatric patients receiving chemotherapy, where the treatment protocol demands this.
- Granulocyte components should continue to be provided as CMV seronegative for CMV seronegative patients

Appendix 7: Prescription, transport and administration of blood products

Prescription of Blood Components

Blood components can only be prescribed by qualified medical staff. If a transfusion is necessary, all blood components must be appropriately prescribed on the UHL Blood Component Prescription and Administration Chart (please see Trust policy: Blood Transfusion - Policy for Prescribing Collection Storage and Administration of Blood and Blood Products, available on UHL Connect)

A valid prescription must include the following information:

- Type of component
- Number of units/volume to be transfused
- Rate of transfusion
- Special requirements e.g. irradiated, CMV negative. This must also be indicated on the request form. Failure to complete this detail will result in the request form being rejected due to the risk of random products being erroneously issued

Transport of Blood and Blood Components

Before collection of any blood component from Blood Bank, to avoid unnecessary wastage and delays, check the following:

- Patients' IV access is patent
- Prescription
- Availability of relevant paperwork e.g. crossmatch form
- Informed verbal consent
- Pre-transfusion observations have been completed

When collecting and transporting blood products from blood bank fridges to clinical areas, please note the following:

- All blood components must be handled with care – red cells especially are easily damaged
- Where available, carry blood components in the red transport bags provided
- Blood components must be delivered to the ward immediately. If the patient's situation changes and blood can no longer be given at that time, it must be returned to Blood Bank within 30 minutes of collection from the laboratory to be returned to stock.
- Always alert Blood Bank staff when returning unused components to ensure that they can be returned to controlled storage in a timely manner
- Hand the product to a qualified member of ward staff
- Red cells must be collected one unit at a time unless exceptionally, the clinical urgency is such that more than one unit of blood is to be transfused simultaneously through separate IV lines
- *Platelets* are stored at room temperature – under no circumstances must they be put into the fridge

Storage of Blood Products

Red cells must only ever be stored in designated blood fridges at 4-6ºC. Transfusion must commence as soon after leaving the blood bank fridge as possible, and must be **completed within 4 hours.**

Platelets, Fresh Frozen Plasma (FFP) and Cryoprecipitate are issued on a named patient basis for immediate transfusion. They must not be collected from the blood bank until the patient is ready for infusion. Platelets and cryoprecipitate must not be placed in any blood fridge. They must be transfused immediately after collection from

the laboratory. FFP can be kept in a designated blood bank refrigerator at 4c for up to 24hrs. If removed from the fridge, it must be returned within 30 minutes or the transfusion completed within 4 hours

Blood Components that are kept out of the fridge for more than 30 minutes and not transfused must be returned to blood bank for wasting

Human Albumin Solution (HAS) is stored at room temperature and can be kept on the ward for several hours as long as the temperature does not go outside 2-25º C.

Do NOT place any blood component in a domestic refrigerator or drug fridge

Administration of Blood Components

Administration of blood components is fully covered in the Blood Transfusion - Policy for Prescribing Collection Storage and Administration of Blood and Blood Products which is available on UHL Connect.

In the interest of patient safety, overnight transfusions must be avoided unless deemed absolutely necessary.

If you have any concerns about the blood component, **DO NOT TRANSFUSE**. Use the contacts list at the front of this document for further advice.

Do not add any drugs or fluid to a blood component. A fresh giving set must be used with each separate blood component, i.e. when switching from red cells to platelets or FFP.

On completion of a transfusion, only 0.9% normal saline must be used as a flush, this includes blood warmers. No other fluid must be mixed with blood components, or blood components mixed with other blood components.

Transfer of Patients Receiving a Transfusion

If a patient undergoing a transfusion is to be transferred to another ward/department within UHL, a qualified member of staff trained in IV administration and competent in transfusion must accompany them.

Any untransfused blood components must remain in a designated blood fridge for the receiving ward/department to collect as necessary. It is against UHL policy to send any blood components with a patient unless they are in progress at the time of transfer. Exceptionally, blood bank can arrange to package blood components in a transfer box for you. Liaise with blood bank staff if this service is absolutely necessary.

If a patient undergoing a transfusion needs to be transferred to a different trust, consider whether they will need to have crossmatched blood components sent with them. Please refer to the Blood Transfusion Policy for Prescribing Collection Storage and Administration of Blood and Blood Products which is available on UHL Connect, to the Trent Transfer policy if the patient is being transferred within the Trent region, or contact Blood Bank for more information.

If a patient is transferred to UHL whilst undergoing a transfusion, ensure that 3 patient identifiers are used to check the blood i.e. the patient's FULL name, date of birth and the referring hospital's patient identification number. Ensure that the accompanying paper work is checked to verify if the products are in date and are safe to be administered.

Blood bank MUST be notified of any blood or blood components that enter the UHL. This is part of the **Legal** requirement to ensure 100% compliance with traceability of blood and blood components.

Disposal of Blood Bags

On completion of a successful transfusion episode, all used blood component packs must be placed back into the red transport bag which must be marked on the white panel with the patients name and the date of transfusion. These bags must then be kept in a designated area on each ward/theatre for at least 24 hours. This will make it possible to investigate any possible delayed transfusion reactions. After 24 hours, the bags must be disposed of as per the Waste Management Policy. Giving sets are disposed of into a sharps bin.

In the event of a serious transfusion reaction, the implicated blood component pack must be sent to the blood transfusion laboratory, with the giving set still attached to the blood component pack, and the cannula end of the giving set sealed using an appropriate bung.

Appendix 8: Transfusion reactions and adverse event reporting

Transfusion Reactions

Detailed guidance on transfusion reactions is fully covered in the Blood Transfusion - Policy for Prescribing Collection Storage and Administration of Blood and Blood Products which is available on UHL Connect and included in the Blood Transfusion Integrated Care Pathway.

When reporting a suspected transfusion reaction:

- Stop the transfusion **immediately**.
- The cannula must be kept patent with a slow running drip of 0.9% saline until medical staff have reviewed the patient.
- Staff must seek immediate advice from the patient's own medical team. The patient's own medical team may in turn seek advice from the Haematology SpR on call if necessary.
- The patient's clinical team must refer to the algorithm on the Blood Transfusion Integrated care pathway (i.e., blood transfusion prescription chart) for further guidance on the immediate management of a transfusion reaction.
- Details of the transfusion reaction must be discussed with the blood transfusion laboratory.

If after review by the patient's medical team, the reaction is considered to be significant, proceed with the following:

- Ward / clinical staff must take **blood cultures, a group and save, FBC, U+Es** and a **clotting screen** from the patient irrespective of the symptoms of transfusion reaction
- The implicated unit must be sent **IMMEDIATELY** to Blood Bank WITH THE GIVING SET STILL ATTACHED.
- Clinical staff must complete a **Datix** incident form. Report the Datix reference number to Blood Transfusion staff on 0116 258 3211

Event/Incident Reporting

It is a legal requirement that any incidents or events related to blood transfusion are reported. This must include suspected transfusion reactions and post transfusion infections.

A DATIX incident form must always be completed - even if it was just a near miss, and notified to Blood Transfusion staff.

The Blood Transfusion team or Lead Transfusion Practitioner will report to SHOT (Serious Hazards of Transfusion and SABRE (Serious Adverse Blood Reactions and Events) as appropriate.

Appendix 9: Blood Product Traceability

Use of BloodTrack

Maintaining vein to vein traceability of all blood products is a legal requirement. All units which are removed from the blood transfusion fridges must be 'fated', i.e. the final outcome of that unit is documented. This includes whether the unit was transfused, returned to stock, wasted etc. Within UHL, this is automatically recorded using BloodTrack.

To maintain traceability, ensure the individual collecting the component has been adequately trained to carry out this duty and is fully competent in the use of the BloodTrack system. Staff bar codes for use with the BloodTrack system are unique to the individual and must not be shared. If you require training contact the Blood Bank to arrange a mutually convenient time.

Always ensure a pickup slip is generated using electronic blood track for ALL transfusion fluids (including albumin solution).

Orange Blood Fate Documentation Cards

Orange traceability cards have been withdrawn from use for blood and blood components within UHL. However they are still used for **Albumin, Octaplex (Beriplex), Octaplas** and **NovoVII** issue. Orange cards are also issued with blood components to external hospitals where the Blood Track devices are not implemented. On these occasions only, the procedure outlined below must still be followed.

Compatibility tags, attached to blood components are in two halves (one white; one 'orange'), folded in the middle. The white section has a peel-off section detailing the donation number and must be peeled off and stuck onto the Integrated Care Pathway (ICP).

The orange section must be completed immediately by the person starting the transfusion/ administering the product. Please detach along the perforations, fill in the required details, and return it to the Blood Transfusion department as soon as transfusion commences either via the air tube or the specimen porter's service. Do not return the cards using the internal mail – this can be slow and cause delays.

These products will then have their fate documented by the laboratory on return of the orange card to maintain the **legal requirement** for 100% traceability of blood products/ components.

If the orange card is mislaid alternative evidence of transfusion must still be sent back to Blood Transfusion within 24hours of start of transfusion/administration. Please take a photocopy of the prescription chart (Integrated Care Pathway, ICP), detailing the unit number of the product, including 2 signatures.

Failure to return evidence of transfusion will result in a Datix report being submitted against the clinical area

Appendix 10: Blood Transfusion Alternatives

Transfusions may not always be the best treatment option for patients, as it poses a significant risk. Whilst every conceivable and practical step is taken to mitigate this risk, it must not be underestimated. With this in mind, always consider if an alternative to transfusion is available and more appropriate e.g. treating iron deficiency anaemia with iron supplements.

To determine transfusion need, always assess the patient's clinical state AND laboratory values although if these do not correlate, treat as per clinical symptoms. If a patient remains asymptomatic and otherwise stable with no further blood loss anticipated (such as post-operatively), it is strongly advisable to avoid exposing them to the potential hazards of allogeneic (donated) blood.

To avoid the need for blood transfusion, the following alternatives are available within UHL:

Haematinic Replacement: Haemoglobin and red cell count may be optimised prior to surgery to reduce the need for intra- or post-operative transfusion

Intra-Operative Cell Salvage: The patient's own blood, lost during surgery, is collected, cleaned, processed and returned to the patient. Although encouraged in other types of surgery, intra-operative cell salvage is mainly used in:

- Cardiac surgery
- Orthopaedic surgery
- Liver surgery
- Vascular surgery
- Complex obstetric surgery

For further information about cell salvage, please contact a blood transfusion nurse practitioner

Appendix 11: Blood Transfusion Training

It is a mandatory requirement for all staff involved in the Transfusion process, from collection through to administration, to receive annual training including training in GMP (Good Manufacturing Practice) to ensure compliance with National Guidelines and to address issues of patient safety and product liability.

Within UHL each Clinical Management Group (CMG) has a mandatory training program and blood transfusion must be a fundamental part of this.

In addition, the National Patient Safety Agency (NPSA) stipulates that every member of staff involved in any part of the transfusion process must have a Competency Assessment every 3 years. Within UHL, all relevant staff groups must successfully complete the blood transfusion e-learning modules before registering for a face-to- face Competency Assessment. The assessments will be carried out by a qualified LCAT (Leicester Clinical Assessment Tool) assessor competent in blood transfusion.

To register for Competency Assessments or to complete E-learning modules follow the HELM Education and Learning Link on UHL Connect.

Appendix 12: Test Directory

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
17-Alpha Hydroxy Progesterone (Adult)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	4-6 weeks	Male: 1 - 8.7 nmol/L Female: - Follicular phase: 1 -8.7 nmol/L Luteal phase: <18nmol/L Pre-pubertal children (6m – 15y): <15 nmol/L Neonatal: <20 nmol/L	Not available to Primary Care Analysed at St Bartholomew's Hospital, London
17-Alpha Hydroxy Progesterone (Paediatric)	Special Biochemistry	1 x 1.2mL serum (No gel separator) (Paediatric)	4-6 weeks	Neonatal: <20 nmol/L	Not available to Primary Care Age of patient must be >2 days Analysed at St Bartholomew's Hospital, London
17-Beta Oestradiol	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult females: Follicular phase: 72 - 529 pmol/L Ovulatory phase: 235 - 1309 pmol/L Luteal phase: 205 - 786 pmol/L Menopausal: <118 pmol/L Adult males: <146.1 pmol/L	State day of menstrual cycle

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
3-hydroxybutyrate with Free Fatty Acids (Paediatric)	Special Biochemistry	1 x 1.2mL Fluoride EDTA (Paediatric)	4-6 weeks	Interpretation provided on report	Not available to Primary Care Analysed at Sheffield Children's Hospital Hypoglycaemic sample required
3-Methoxytyramine	Special Biochemistry	24 hour urine (adults) or random urine (paediatric)	15 working days	Adult: <2.3µmol/24 hours	
A					
α2 Antiplasmin	Special Haematology	1 x 4.3mL citrate	6 weeks	N/A	Analysed at Royal Hallamshire Hospital. H&T clinical approval is required prior to testing
Acetylcholine receptor antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	30 days	0-5 $x10^{-10}$ M	Analysed at Oxford Radcliffe Hospital.
ACTH	Special Biochemistry	2 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	15 working days	7.2-63 ng/L	Not available to Primary Care. Morning (7 am - 10am) is desirable. Collect in pre-chilled red topped EDTA tube, transport to the laboratory on ice within 30 minutes of collection. Send with cortisol. The Roche method employs a biotinylated monoclonal ACTH-specific antibody; therefore it is advised that for 12 hours before specimen collection, patients should not take multi-vitamins or dietary supplements (eg, hair, skin, and nail supplements) containing biotin (vitamin B7). Sample sent to Sherwood Forest Hospitals NHS Foundation Trust.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Activated Partial Thromboplastin Time (APTT)	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 26.1-36.6	Can be added onto samples up to 8 hours old
Activated Partial Thromboplastin Time Ratio (APTTR)	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 0.8 – 1.2 Telephone Limits: During core hours: >6.0 Outside core hours: N/A	For monitoring heparin therapy Refer to UHL guidelines Can be added onto samples up to 8 hours old
ADA/Diamond-Blackfan anaemia	Special Haematology	4 x 2.7mL EDTA	2 months	N/A	Analysed at Addenbrooke's Hospital Contact Haematology clinician for advice
ADAMTS13	Special Haematology	1 x 4.3mL citrate	24 hours	N/A	Analysed at the Doctor's Laboratory, London. H&T clinical approval is required prior to testing
Adrenal antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Sent to Sheffield Teaching Hospitals NHS Foundation Trust

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Alanine Transaminase (ALT)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 10 - 49 U/L 1 - <10 yrs: 10 – 29 U/L 10 - <19 yrs: 8 -27 U/L ≥19 yrs: 10 – 49 U/L Male: 0 - <1 yrs: 10 - 49 U/L 1 - <10 yrs: 10 – 29 U/L 10 - <19 yrs: 9 - 44 U/L ≥19 yrs: 10 – 49 U/L Telephone Limit: <16 yrs: ≥100 U/L ≥16 yrs: ≥500 U/L	Part of liver function tests
Albumin	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	< 28 days: 30-45 g/L 28-15 yrs: 30-50 g/L >15 years: 35-50 g/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Albumin (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Measure serum and fluid albumin, to calculate SAAG (serum-ascites albumin gradient)
Aldosterone	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks		Not available to Primary Care Send to laboratory within 3 hours of collection Send with renin Interpretation provided
Alkaline Denaturation (APT) test	Blood Transfusion (LRI/LGH/GH)	Various	3 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Alkaline Phosphatase (ALP)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 – <6 months: 145 - 495 U/L 6 months - <1 yrs: 155 - 404 U/L 1 - <10 yrs: 149 – 349 U/L 10 - <12 yrs: 186 - 440 U/L 12 - <15 yrs: 76 - 419 U/L 15 - <19 yrs: 54 – 143 U/L ≥19 yrs: 30 – 130 U/L Male: 0 – <6 months: 145 - 495 U/L 6 months - <1 yrs: 155 - 404 U/L 1 - <10 yrs: 149 – 349 U/L 10 - <12 yrs: 186 - 440 U/L 12 - <15 yrs: 202 - 618 U/L 15 - <19 yrs: 59 – 294 U/L ≥19 yrs: 30 – 130 U/L	Part of liver function and bone profile tests Contact laboratory on ext. 16561 for bone & liver isoenzymes information.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
ALL MRD	Special Haematology	2 x 2.7mL EDTA (blood) OR 1 x 2.7mL EDTA BONE MARROW (1 x 1.2mL Paediatrics)	2 weeks	N/A	Analysed at UCL Medical School.
Allergen-specific IgE/ Component Resolved Diagnostics (CRD)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days for common allergens (Please allow up to 5 weeks for rare allergens)	<0.35 kU/L	
Alpha-1 Acid Glycoprotein	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics) OR 1 x 4.9mL Heparin (1 x 1.2mL Paediatric)	5 working days	0.3-1.1 g/L	
Alpha-1 antitrypsin (genotyping)	Special Biochemistry	1 x 2.7mL EDTA	2 weeks	N/A	Interpretation provided Analysed at Nottingham University Hospitals. Only to be requested when clinically indicated.
Alpha-1 Antitrypsin (Serum)	Routine Biochemistry LRI ONLY	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Urgent Inpatients – 3 hours Wards/Outpatient/ routine GP – 24 hours	0.78-2.00 g/L	Avoid venous stasis

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Alpha-fetoprotein (AFP)	Routine Biochemistry LRI ONLY	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Male/non-pregnant: <10kU/L	
Alternative pathway complement activity (AP100)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	90-130%	Sample must arrive in laboratory within 4 hours of collection
Amino Acids (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric) OR Random Urine in Sterile universal or fluoride bottle	10 working days	N/A	Available to Community Paediatricians Analysed at Nottingham University Hospitals Interpretation provided
Amiodarone (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	Therapeutic: 0.5-2.0 mg/L Potentially toxic : >2.5 mg/L Telephone limit: >2.5 mg/L (Baselt, Deposition of toxic drugs and chemicals in man)	PLEASE NOTE THAT THE AMIODARONE RANGES ARE FOR ADULTS ONLY - NO PAEDIATRIC REFERENCE RANGES ESTABLISHED.
AML molecular markers: FLT3/NPM1/t(15;17)/t(8;21)/inv(16)	Special Haematology	2 x 2.7mL EDTA (Blood or bone marrow)	10 working days	N/A	Analysed at Addenbrooke's Hospital.
AML MRD (not APML)	Special Haematology	4 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	2-3 weeks	N/A	Analysed at Manchester Royal Infirmary

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Ammonia	Routine Biochemistry (LRI ONLY)	1 x 4.9mL Lithium Heparin (1 x 1.2mL for paediatrics)	1 hour	Sick or premature infant: <150 umol/L Neonate (up to 28 days): <100 umol/L Infant to 16 yrs: <50 umol/L Adults: 11 – 32 umol/L Telephone Limits: <28 days: ≥ 100 umol/L ≥28 days: ≥ 50 umol/L	Not available to Primary Care To be transported on ice and received by laboratory within 30 minutes of collection
Amylase (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Measure serum amylase simultaneously
Amylase (serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <6 months: 4.4 – 55 U/L 6 months - <1 yrs: 13 – 63 U/L 1 - <19 yrs: 32 -117 U/L ≥19 yrs: 30 – 118 U/L Urine: ≤650 U/L Telephone Limits: ≥500U/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Amylase (urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Urine: 0 - 650 U/L	
ANCA – MPO (Myeloperoxidase) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	0-6IU/mL Telephone Limits: New positive results will be telephoned to requestor	Ordered within laboratory following positive ANCA result or can be requested separately
ANCA - PR3 (Proteinase 3) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	0-5IU/mL Telephone Limits: New positive results will be telephoned to requestor	Ordered within laboratory following positive ANCA result or can be requested separately
Androstenedione	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult males (≥ 22 years) 1.05–5.76 nmol/L Adult females (22–39 years) 1.29–7.86 nmol/L Adult females (40–54 years) 1.05–6.63 nmol/L	
Angiotensin Converting Enzyme (ACE)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 working days	13-64 U/L	
Antenatal testing	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA	7 working days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Antenatal Haemoglobinopathy	Special Haematology	1 x 2.7mL EDTA *Purple Top* (1 x 1.2mL Paediatrics)	3 working days	Hb A_2 1.9 - 3.4% Hb F 0.0 – 0.7%	MUST also request FBC (with additional 4.9mL EDTA sample). Family origin Questionnaire MUST be provided for antenatal samples. They can be request on samples up to 2 days if stored at room temperature or 7 days old if stored at 4°C. For interpretation of clinical decision values please refer to the GOV.UK Sickle Cell and Thalassaemia Screening handbook. Results may be misleading if the patient has ever received a bone marrow transplant, gene therapy, or if there has been a blood transfusion in the last four months.
Antenatal Screening: Trisomy 13,18 and 21	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum	5 working days	N/A	Patient must have had a scan prior to screening. Always state on request form: maternal weight, ethnicity, smoker and diabetes status, previous pregnancies affected and all scan information including gestation, NT and CRL (see form on page 43) Chance issued with report. Analysed at Kettering General Hospital

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Assay for Heparins/direct Xa inhibitors Rivaroxaban Apixaban Edoxaban Fondaparinux	Special Haematology	2 x 4.3mL citrate	Same day (2hrs on request)	See UHL Guidelines for Heparin and Oral Anticoagulant dosing	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM. Special Haematology to be notified of wards sending samples for these assays. H&T clinical approval is required prior to testing
Antibody investigations	Blood Transfusion (LRI/LGH/GGH)	2 x 7.5mL EDTA	7 days	N/A	
Anti-ganglioside (GD1a, GD1b, GQ1b, GT1b, GM1,GM2 and GM3) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at the Institute of Neurological Sciences, Southern General Hospital Glasgow.
Anti-HLA antibody investigations	Blood Transfusion (LRI/LGH/GGH)	Discuss with laboratory	7 days	N/A	Analysed at NHSBT and UHL Transplant Laboratory NHSBT form required – see link in Appendix 3
Anti-hypertension drug screen	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	2 weeks	N/A	Screen against specified anti-hypertension drugs Specific forms required – obtained through laboratory
Anti-IgA Antibody	Immunology	2 x 6mL EDTA	21 days	N/A	Analysed at NHSBT, Barnsley If detected a National Blood Service card is issued
Anti-myelin-associated glycoprotein (MAG) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at the Institute of Neurological Sciences Southern General Hospital Glasgow.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Anti-neutrophil cytoplasmic antibodies (ANCA)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	N/A	
Anti-nuclear antibodies (ANA)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Antithrombin	Special Haematology	2 x 4.3mL citrate	2 weeks	90 - 120%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Thrombophilia Screen H&T clinical approval is required prior to testing
Antithrombin gene mutation	Special Haematology	2 x 2.7mL EDTA	6 weeks	N/A	Analysed at Addenbrooke's Hospital
APML MRD	Special Haematology	8 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	2 weeks	N/A	Analysed at Guy's Hospital, London Do not send samples on Friday
Apolipoprotein A1	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0.96-2.04 g/L Male: 0.79-1.91 g/L	Not available to Primary Care
Apolipoprotein B	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0.47-1.61 g/L	Not available to Primary Care

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Argatroban	Special Haematology	2 x 4.3mL citrate	Same day (2hrs on request)	No reference range	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM. H&T clinical approval is required prior to testing
Aspartate Transaminase (AST)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 25 – 90 U/L 1 - <7 yrs: 27 – 49 U/L 7 - <13 yrs: 20 - 40 U/L 13 - <19 yrs: 16 - 28 U/L ≥19 yrs: 0 – 34 U/L Male: 0 - <1 yrs: 25 – 90 U/L 1 - <7 yrs: 27 – 49 U/L 7 - <13 yrs: 20 - 40 U/L 13 - <19 yrs: 17 - 44 U/L ≥19 yrs: 0 – 34 U/L	
Aspergillus fumigatus IgG precipitins	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	4 days	0-40mg/L Cystic Fibrosis patients - 0-90mg/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Autoantibody screen - smooth muscle antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Autoantibody screen – liver kidney microsomal (LKM) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Autoantibody screen – mitochondrial antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Autoantibody screen – Parietal cell (PC)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Autoimmune Neutropaenia Screen	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel	14 working days 21 working days if further investigations required	N/A	Contact Filton NHSBT to discuss crossmatch requirements Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Autoimmune Thrombocytopaenia (AITP)	Blood Transfusion (LRI/LGH/GGH)	3 x 2.7mL EDTA AND 2 x 4.9mL Serum Gel	7 days	N/A	Contact laboratory before collecting samples Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Avian IgG precipitins	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	Pigeon <40mg/mL Budgie <40mg/mL	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
B					

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
β2 glycoprotein (β 2GPI) IgG and IgM antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	0-20CU	
Basal ganglia antibodies	Immunology	2 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at the Institute of Neurology and Neurosurgery, Queen's Square, London.
Basophils	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 0.02 – 0.10 x 10^9/L	Part of Full Blood Count
Basophil activation test (BAT)	Immunology	5mL EDTA whole blood and 5mL EDTA whole blood from healthy volunteer as a control sample (ambient temperature).	5 working days	See report for relevant ranges for the allergens tested and interpretation of results.	Sent to Sheffield Northern General hospital. Requesting clinician to discuss and pre-arrange with Immunology Sheffield Northern General hospital and Immunology Leicester Royal Infirmary. Drugs sent alongside samples should be kept cool and sent in a box with ice packs.
BCR-ABL (Diagnostic)	Special Haematology	2 x 2.7mL EDTA (Blood or bone marrow)	10 working days	N/A	BCR ABL samples must be delivered to the Special Haematology Laboratory urgently and by no later than 4pm. Samples NOT to be sent on Fridays Analysed at HODS, Addenbrookes Hospital, Cambridge

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
BCR-ABL (Quantitative)	Special Haematology	6 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	10 working days	N/A	'BCR ABL samples must be delivered to the Special Haematology Laboratory urgently and by no later than 4pm. A Samples NOT to be sent on Fridays Analysed at HODS, Addenbrookes Hospital, Cambridge
BCR-ABL Kinase Domain Mutation Analysis	Special Haematology	7 x 2.7mL EDTA	21 days	N/A	Sample analysed at King's College Hospital, London
Beta-2 Microglobulin	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	1.0-2.4 mg/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Bicarbonate	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 13.8 – 23.3 mmol/L 1 - <5 yrs: 16.6 – 25.3 mmol/L 5 - <15 yrs: 17.9 – 27.7 mmol/L 15 - <19 yrs: 19.9 – 31.3 mmol/L ≥19 yrs: 22 – 29 mmol/L Male: 0 - <1 yrs: 13.8 – 23.3 mmol/L 1 - <5 yrs: 16.6 – 25.3 mmol/L 5 - <15 yrs: 18.1 – 27.3 mmol/L 15 - <19 yrs: 20.2 – 27.1 mmol/L ≥19 yrs: 22 – 29 mmol/L	Not available to Primary Care
Bile Acids	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-10 umol/L Telephone limits: ≥ 19 umol/L (In pregnant patients only)	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Bilirubin (conjugated)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <10 yrs: 0 – 1.71 umol/L 10 – <19 yrs: 1.71 – 10.30 umol/L ≥19 yrs: 0 – 5 umol/L Male: 0 - <10 yrs: 0 – 1.71 umol/L 10 – <19 yrs: 1.71 – 13.70 umol/L ≥19 yrs: 0 – 5 umol/L Telephone Limits: ≤28 days old: ≥25umol/L	
Bilirubin (total) (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Measure serum total bilirubin simultaneously

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Bilirubin (total)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <2 yrs: 3.4 – 104.0 umol/L 2 – <12 yrs: 5.10 – 14.0 umol/L 12 – <19 yrs: 3.40 – 12.0 umol/L ≥19 yrs: 0 – 21 umol/L Male: 0 - <2 yrs: 3.4 – 104.0 umol/L 2 – <12 yrs: 5.10 – 14.0 umol/L 12 – <19 yrs: 5.10 – 29.0 umol/L ≥19 yrs: 0 – 21 umol/L Telephone Limit: >300umol/L	
Biotinidase (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	4-6 weeks	1.9 – 7.1 iu/L	Not available to Primary Care Analysed at Nottingham University Hospitals
Blood Film	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	3 working days	N/A	May require clinical comment
Bone marrow aspirate immunophenotyping	Immunology	1 x 2.7mL EDTA BONE MARROW	Urgent Acute Leukaemia 4 hours Myeloma 24 hours All others 3 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Bone Marrow integrated report	Special Haematology (trephine processed by histology)	BMA slides x 8 Trephine >16mm, 10% formalin (as required)	28 days	N/A	Samples should arrive in laboratory before 4pm Current FBC results must be provided on request form
NT-Pro BNP	Routine Biochemistry (LRI/GH)	Preferred sample type: 1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics) Also acceptable: 1 x 2.7mL grey-top EDTA (1 x 1.2mL Paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	<400 ng/L - Heart failure unlikely 400-2000 ng/L - Heart failure not excluded >2000 ng/L - Heart failure likely	
C					
C Reactive Protein (CRP)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-10mg/L Telephone Limit: ≥250mg/L	Do not repeat within 48hrs
C1 esterase inhibitor	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	0.21-0.38g/L	Sample should reach laboratory within 6 hours
C1q antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	25 days	0-15 U/mL	Sample should reach laboratory within 24 hours Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
C1q level	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	50-250 mg/L	Sample should reach laboratory within 24 hours Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
C3 nephritic factor	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	Sample should reach laboratory within 6 hours Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Caeruloplasmin	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 working days	Adult: 0.2 – 0.6g/L	Analysed at Nottingham City Hospital
Caffeine (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	15 working days	Non-toxic: 10-20mg/L Potentially toxic: >20mg/L	Not routinely available – contact laboratory (x6555) to discuss
Calcitonin	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	15 working days	Female: 0 – 4.8 ng/L Male: 0 – 11.8 ng/L	Transport to laboratory on ice To be received by laboratory within 30 mins of collection Fasting sample recommended Analysed at Charing Cross Hospital
Total and Adjusted Calcium (serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	2.12 – 2.51 mmol/L Telephone Limits: ≤1.8mmol/L ≥3.2mmol/L	Part of bone profile tests

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Calcium (urine)	Routine Biochemistry (LRI ONLY)	24 hour urine acidified (2M HCl) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr Urine: 2.50 – 7.50 mmol/24hrs Calcium: creatinine ratio: ≤0.59	Paediatric patients only: Urine acidified on receipt in laboratory
Calculus	Special Biochemistry	Stone or stone fragments in 20mL Universal, 60mL pot or any suitable plastic container. No preservative.	4 weeks	N/A	Interpretation provided
CAL-Reticulin (Exon 9)	Special Haematology	2 x 2.7mL EDTA	15 working says	N/A	Analysed at Addenbrooke's Hospital, Cambridge
Carbamazepine (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Non-toxic: 4-12mg/L Telephone Limit: ≥25mg/L	
Carbohydrate antigen CA125	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-35 kU/L	For full interpretation of the result, see NICE guideline CG122
Carbohydrate antigen CA15.3	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-35 kU/L	
Carbohydrate antigen CA19.9	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-37 kU/L	
Carcinoembryonic antigen (CEA)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 – 2.5 ug/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Caritine Acyl and Free (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	4-6 weeks	Free Carnitine: 15-53 mmol/L	Available to Community Paediatricians Analysed at Sheffield Children's Hospital.
CASPR2 Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Oxford Radcliffe Hospital
Catecholamines - Dopamine	Special Biochemistry	24 hour urine acidified (H_2SO_4) or random urine acidified for children	15 working days	Adult:<3µmol/24 hours Paediatric: Available on request.	Paediatric urine must reach laboratory within 1 hour of collection. Children's values reported as creatinine ratio
Catecholamines - Homovanillic acid (HVA)	Special Biochemistry	24 hour urine acidified (H_2SO_4) or random urine acidified for children	15 working days	Adult:<40µmol/24 hours Paediatric: Available on request.	Paediatric urine must reach laboratory within 1 hour of collection.
Catecholamines - Adrenaline	Special Biochemistry	24 hour urine acidified (H_2SO_4) or random urine acidified for children	15 working days	Adult:<200nmol/24 hours Paediatric: Available on request.	Paediatric urine must reach laboratory within 1 hour of collection. Children's values reported as creatinine ratio
Catecholamines - Noradrenaline	Special Biochemistry	24 hour urine acidified (H_2SO_4) or random urine acidified for children	15 working days	Adult:<700nmol/24 hours Paediatric: Available on request.	Paediatric urine must reach laboratory within 1 hour of collection. Children's values reported as creatinine ratio
Catecholamines - VMA	Special Biochemistry	24 hour urine acidified (H_2SO_4) or random urine acidified for children	15 working days	Adult:<40µmol/24 hours Paediatric: Available on request.	Paediatric urine must reach laboratory within 1 hour of collection. Children's values reported as creatinine ratio

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
CD34+ stem cell enumeration	Immunology	As provided by Stem Cell Laboratory according to procedure (buffy coat, bone marrow, peripheral blood, or positive selection sample)	1 hour for blood samples 2 hour for buffy coat samples	N/A	
CD4 count monitoring in HIV infection	Immunology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	2 days	0.49-1.67x10^9/L (adults)	Sample should reach laboratory within 48 hours Please ensure sample reaches laboratory before 16:30 on Fridays
Centromere antibodies (IFA)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	N/A	
Cerebrospinal Fluid (CSF)/ other fluid immunophenotyping	Immunology	>0.5mL in transfix bottle	24 hours	N/A	
Chloride (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	98 – 107 mmol/L	Not available to Primary Care
Chloride (Urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr Urine: 110 - 250 mmol/24hr	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Chloride Assay – See Sweat Test (Paediatric)	Special Biochemistry	Sweat collection	7 days	<6 months old: 0-30 mmol/L CF unlikely 30-60 mmol/L equivocal >60 mmol/L CF likely >6 months old: 0-40 mmol/L CF unlikely 40-60 mmol/L equivocal >60 mmol/L CF likely	Not available to Primary Care

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Cholesterol (HDL)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <6 months: 0.60 – 2.10 mmol/L 6 months - <2 yrs: 0.70 – 1.70 mmol/L 2 - <14 yrs: 0.90 – 2.00 mmol/L 14 - <19 yrs: 0.80 – 2.00 mmol/L ≥19 yrs: 0.90 – 2.20 mmol/L Male: 0 - <6 months: 0.60 – 2.10 mmol/L 6 months - <2 yrs: 0.70 – 1.70 mmol/L 2 - <14 yrs: 0.90 – 2.00 mmol/L 14 - <19 yrs: 0.80 – 1.90 mmol/L >19 yrs: 0.90 – 2.20 mmol/L	Required for primary CVD calculation
Cholesterol (total)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <19 yrs: 3.00 – 5.49 mmol/L No ranges for ≥19 years old	Required for primary CVD calculation
Cholesterol (Total) (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Cholesterol (Total/HDL Ratio)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Required for primary CVD calculation
Cholinesterase Studies (Phenotype and Genotype)	Special Biochemistry	1 x 4.9mL EDTA	4-6 weeks	>5300iu/L	Analysed at Bristol Southmead Hospital Report will give phenotype Call x16553 for advice
Chromogenic VIII assay	Special Haematology	1 x 4.3mL citrate	2 weeks	60.2 - 182.7 IU/dL	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Clobazam	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	30-300ug/L	Trough level preferable. Analysed at TDM Unit, Epilepsy Centre, Chalfont St Peter. Clobazam metabolite (norclobazam) also analysed.
Clonazepam	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	20-70ug/L	Trough level preferable. Analysed at TDM Unit, Epilepsy Centre, Chalfont St Peter.
C-KIT D816V	Special Haematology	2 x 2.7mL EDTA (blood) OR 1 x 2.7mL EDTA BONE MARROW(1 x 1.2mL Paediatrics)	2 months	N/A	Analysed at Addenbrooke's Hospital
Classical pathway complement activity (CH100)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	392-1019 U/mL	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
CLL MRD	Special Haematology	3 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	10 working days	N/A	Analysed at HMDS, Leeds
Cold agglutinins	Blood Transfusion (LRI/LGH/GGH)	2 x 7.5mL EDTA	7 days	N/A	Samples must be transported to laboratory at 37°C
Collagen Binding Assay	Special Haematology	2 x 4.3mL citrate	4 weeks	50 - 200%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of von Willebrand Screen H&T clinical approval is required prior to testing
Collagen Type II Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Complement C3 and C4	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	2 days	C3: 0.75-1.65 g/L C4: 0.14-0.54 g/L	
Copper	Special Biochemistry	1 x 10 mL serum (no gel separator) (1 x 1.2mL Paediatric) OR 24 hour urine	10 working days (serum) 10 working days (urine)	12-25umol/L	Analysed at Nottingham University Hospitals

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Cortisol	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	9.00am: 145 - 619 nmol/L Telephone Limits: <100nmol/L	Always state time of sample; should be 9.00 am. State current medications
Cortisol (urine free)	Special Biochemistry	24 hour urine plain bottle)	20 working days	28-221nmol/24hrs	Analysed at South Manchester Hospital
C-peptide	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	268 – 1275 pmol/L	Not available to Primary Care Prevailing blood glucose <2.5mmol/L required Interpret results as appropriate to prevailing glucose level
Creatine Kinase (CK)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <14 yrs: 58 – 312 U/L 14 - <19 yrs: 56 – 541 U/L ≥19 yrs: 25 – 200 U/L Male: 0 - <14 yrs: 58 – 312 U/L 14 - <19 yrs: 88 – 903 U/L ≥19 yrs: 40 – 320 U/L Telephone Limit: ≥5000 U/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Creatinine (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	
Creatinine (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adults (≥ 16 years): 60-120 µmol/L Gender specific paediatric ranges available on request Telephone limits: ≥16 yrs: ≥354 umol/L 12-16 yrs: ≥200umol/L <12 yrs: 3 x upper limit of normal	The Jaffe method is used for the majority of patients. Enzymatic analysis is used in patients ≤ 16 years of age and where the laboratory identifies potential interference from bilirubin.
Creatinine (Urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 5.3 – 15.9 mmol/24hr Male: 8.4 – 22 mmol/24hr	
Creatinine Clearance	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics) AND 24 hour urine	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult males: 90-130mL/min Adult females: 80-120mL/min	Send simultaneous urine and serum samples

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Cross Match (without valid group & screen)	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA	24 hours (patients without red cell antibodies) 5 hours (urgent samples – MUST be agreed with laboratory and identified on request form) Presence of antibodies will prolong process.	N/A	See appendix 4 for valid group and screen sample criteria
Cross Matching (with valid group & screen)	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA	Maximum 3 hours (Urgent perioperative samples turned around within 10 minutes when arranged directly with laboratory)	N/A	See appendix 4 for valid group and screen sample criteria Cross match technique will be dependent on clinical scenario, patient transfusion history etc. If further information required, contact laboratory
Cryofibrinogen	Immunology	2 x 2.7mL EDTA (2 x 1.2mL Paediatrics) AND 2 x 4.9mL serum gel (2 x 1.1mL serum gel for paediatrics)	9 days	N/A	Contact laboratory before taking blood to arrange collection and transport. Samples to be transported at 37°C.
Cryoglobulins	Immunology	2 x 4.9mL serum gel (2 x 1.1mL serum gel for paediatrics)	9 days	N/A	Contact laboratory before taking blood to arrange collection and transport. Samples to be transported at 37°C.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
CTX beta crosslaps	Special Biochemistry	1 x 1mL Plasma (Separate EDTA plasma from cells and freeze within 24 hours of collection)	2-4 weeks	Male <29.9 yrs: 0.24-1.02 ug/L 30- 30.9 yrs: <0.23-0.94 ug/L 40-49.9 yrs: <0.18-0.80 ug/L 50 – 59.9 yrs: <0.16-0.74 ug/L 60 – 69.9 yrs: <0.13-0.75 ug/L >70 yrs: <0.12-0.78 ug/L Female <29.9 yrs: 0.15-0.97 ug/L 30- 30.9 yrs: <0.15-0.64 ug/L 40-49.9 yrs: <0.13-0.67 ug/L 50 – 59.9 yrs: <0.18-1.06 ug/L 60 – 69.9 yrs: <0.17-0.97 ug/L >70 yrs: <0.15-0.86 ug/L	Not available to Primary Care Fasting sample received by laboratory within 3 hours of collection. Analysed at King's Mill Hospital
Cyanide	Special Biochemistry	2 x 2.7mL Fluoride EDTA (5 x 1.2mL Paediatric)	4-6 weeks	Usual/non-toxic: <10µg/100mL Toxic: Over 100µg/100mL	Not available to Primary Care Transport to laboratory immediately Analysed at University Hospitals of Wales

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Cyclic citrullinated peptide (CCP) antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	0-6 U/mL negative 7-10 U/mL equivocal >10 U/mL positive	
Cyclosporin (monitoring)	Special Biochemistry	1 x 4.9 mL EDTA	3 days	Telephone Limit: >300 ug/L	Not available to Primary Care. Contact pharmacy for interpretation. Analysed at Nottingham University Hospitals (normal working hours) or Wythenshawe Hospital (weekends and bank holidays).
D					
D-Dimers	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 0.00-0.50 ug/ mL FEU Telephone Limits: Raised d-dimers only if new sepsis or DIC	Can be added on to samples up to 24 hours old
Dabigatran	Special Haematology	2 x 4.3mL citrate	Same day (2hrs on request)	No reference range	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM. H&T clinical approval is required prior to testing

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Desethylamiodarone (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	No therapeutic range established for desethylamiodarone although most individuals will have roughly equivalent concentrations of desethylamiodarone to amiodarone at a steady state.	
DHEA-S	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult males: 0.94–15.44 umol/L Adult females: 0.70–12.49 umol/L	
Digoxin (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Therapeutic Range: 0.8 – 2.0 ug/L Telephone Limit: ≥2.5ug/L (confirm sample taken 6 hours post dose)	Target range only applies to samples taken more than 6 hours post dose and at steady state. There is an increased risk of toxicity (even if result within therapeutic range) if 2 or more of following: Age >40yrs Potassium <3.5mmol/L Adj.Ca >2.8mmol/L Creatinine >150umol/L
Direct Antiglobulin Test (DAT)	Blood Transfusion (LRI/LGH/GGH)	1 x EDTA (any size)	24hrs (urgent requests to be processed quicker)	N/A	
Double stranded DNA antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 days	<27 IU/mL (normal) 27-35IU/mL (indeterminate)	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Double stranded DNA antibodies (Crithidia)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	
DPD Screening (for 5FU toxicity)	Special Biochemistry	2 x 2.7mL EDTA	3 working days	N/A	Analysed at St Thomas' Hospital, London
Drug Induced Thrombocytopaenia	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel AND Sample of drug(s)	20 working days	N/A	Contact laboratory before collecting samples Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Drug Related Neutropaenia	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel AND Sample of drug(s)	14 working days 21 working days if further investigations required	N/A	Contact blood transfusion laboratory before collecting samples Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Drugs of Abuse Screen	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	5 working days	Cut-offs available on request	
Dyskeratosis Congenita (DKA) mutation	Special Haematology	5 x 2.7mL EDTA	6 months	N/A	Analysed at Blizard Institute, University of London Additional request form needed, contact : i.dokal@qmul.ac.uk
E					
ELISPOT T-test	Immunology	>10 yrs: 2 x 4mL lithium heparin 2-9yrs: 1 x 4mL lithium heparin <2 years: 1 x 2mL lithium heparin (paediatric)	48 hours	Negative: < 5 spots Equivocal: 5-8 spots Positive: > 8 spots	Samples must be analysed within 6 hours of collection and be received by the laboratory before 2pm. All requests must be discussed with the laboratory

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
EMA Binding (red cell membrane defects)	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	1-24 days dependent on complexity	N/A	Analysed at Birmingham Children's Hospital Contact laboratory prior to collection of samples H&T clinical approval is required prior to testing
Emicizumab	Special Haematology	1 x 4.3mL Citrate	2 weeks	N/A	Requests only accepted from Haematology Clinicians H&T clinical approval is required prior to testing
Endomysial antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	N/A	Ordered within laboratory following positive IgA tTG antibodies
Eosinophil count	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2years: 0.00-0.50 x 10^9/L >2 years: 0.04-0.40 x 10^9/L	Part of Full Blood Count

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Ethanol	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	10 – 50 mg/100mL = Subclinical 30 – 120 mg/100mL = Euphoria 90 – 250 mg/100mL = Excitement 180 – 300 mg/100mL = Confusion 250 – 400 mg/100mL = Stupor 350 – 500 mg/100mL = Coma Telephone Limit: ≥400mg/100mL	Legal driving Limit: 80mg/100mL This assay not be used for legal purposes
Ethosuximide (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	15 working days	Non-toxic: 40-120mg/L Potentially toxic: >100 mg/L	Analysed at TDM Epilepsy Centre
Ethylene Glycol	Special Biochemistry	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatric)	5 working days	Severe toxicity: >50 mg/100mL Telephone Limits: Phone ALL results	Analysed at Birmingham City Hospital. Not available to Primary Care
Extended ENA profile	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	N/A	Analysed at Nottingham University Hospitals NHS Trust
Extractable nuclear antigen (ENA) antibodies – Centromere B (CENP) antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Extractable nuclear antigen (ENA) antibodies – Jo-1 antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable nuclear antigen (ENA) antibodies – La (SS-B) antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable nuclear antigen (ENA) antibodies – RNP (U1 RNP and RNP70) antigens	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable nuclear antigen (ENA) antibodies – Ro (SS-A) antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable nuclear antigen (ENA) antibodies – Scl-70 antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable nuclear antigen (ENA) antibodies – Smith (Sm) antigen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Extractable Nuclear Antigen (ENA) Screen	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	
Erythropoietin assay (EPO)	Special Haematology	1 x 4.9mL serum gel OR 1 x 4.9mL Lithium Heparin	10 working days	N/A	Analysed at Southampton General Hospital

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
F					
Factor II	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	78.7 – 115.5%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor IX	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	72 - 154%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor Sensitive APTT	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	Batch specific- refer to report	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Special Clotting Screen H&T clinical approval is required prior to testing
Factor V	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	53.8 – 127.7%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor V Leiden	Special Haematology	1 x 2.7mL EDTA OR 1 x 4.3mL Citrate	28 working days	N/A	Analysed at QMC, Nottingham

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Factor VII	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	47.4 – 143.4%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor VII genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form
Factor VIII	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	59.6 – 177.6%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor VIII binding	Special Haematology	2 x 4.3mL Citrate	6 weeks	N/A	Analysed at Royal Hallamshire Hospital, Sheffield Include FVIII, vWFAg and vWF results if possible H&T clinical approval is required prior to testing
Factor X	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	73.1- 132.7%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor X genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Factor XI	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	74- 152%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor XI genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form
Factor XII	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	35 - 147%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Factor XIII screen	Special Haematology	1 x 4.3mL citrate	2 weeks	N/A	Please Discuss with Laboratory Assay sent to referral lab H&T clinical approval is required prior to testing
Factor H	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	0.35-0.59g/L	Sample must arrive in laboratory within 4 hours of collection Analysed at Royal Victoria Infirmary, Newcastle upon Tyne Only available for Nephrology by discussion with Immunology Consultant

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Factor I	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	21-40mg/L	Sample must arrive in laboratory within 4 hours of collection Analysed at Royal Victoria Infirmary, Newcastle upon Tyne Only available for Nephrology by discussion with Immunology Consultant
Faecal Calprotectin	Routine Biochemistry (LRI ONLY)	Blue Top Universal plain bottle with spoon Pea size faecal sample	5 working days	<80 ųg /g stool: Not indicative of inflammation in the gastrointestinal tract 80-160 ug/g stool: Not directly indicative of an active inflammation requiring immediate follow-up with invasive testing. Inflammation cannot be excluded. >160 ug/g stool: Indicative of neutrophil infiltrate in the gastrointestinal tract - therefore, this may signal the presence of active inflammatory disease.	Full interpretive comment provided with results

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Faecal Elastase	Routine Biochemistry (LRI ONLY)	Blue Top Universal plain bottle with spoon Pea size faecal sample	4-6 weeks	<100 µgEl/g stool = Severe pancreatic insufficiency 100-200 µgEl/g stool = Moderate pancreatic insufficiency >200 µgEl/g stool = Normal	
Faecal Immunochemical Test (FIT)	Special Biochemistry	1 x white FIT picker	2 working days	N/A	Sample must arrive with request form. Additional kits can be requested from uhl-tr.uhlfittestingmailbox@nhs.net
Faecal porphyrins quantitation	Special Biochemistry	Faeces (fresh random sample)	5 weeks	N/A	Protect sample from light Fresh faeces Only for known patients or abnormal screens Interpretation provided Analysed at University Hospitals of Wales
Fanconi's anaemia screen	Special Haematology	1 x 4.9mL Lithium Heparin	10 working days	N/A	Analysed at Guy's Hospital London. Requires genetics specimen form, MUST contain NHS number Contact Haematology clinician for advice
Farmers Lung (EEA) MICROPOLYSPORUM/THERMOACTINOMYCES	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	<60mg/L	Analysed at Sheffield Teaching Hospital

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Ferritin	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 to <1 years: 5.7 - 421 ng/mL 1 to <13 years: 12.8 - 88.7 ng/mL 13 - <19 years: 6.8 - 75.6 ng/mL ≥19 years: 10-291 ng/mL Male: 0 to <1 years: 5.7 - 421ng/mL 1 to <13 years: 12.8 - 88.7 ng/mL 13 to <19 years: 10.9 - 135 ng/mL ≥19 years: 22-322 ng/mL	Levels rise with inflammation, regardless of iron status
Foetal maternal haemorrhage estimation (FMH)	Blood Transfusion (LRI/LGH/GGH)	Maternal: 1 x 7.5mL EDTA Newborn: 1 x 7.5mL EDTA (cord) or 1 x 1.2mL EDTA (heel prick sample)	72 hours from time of event	if any foetal cells are seen in 25 low power fields then a full count will be performed'	Maternal samples to be taken at least 30 to 45 minutes post event
Foetal/Neonatal Alloummune Thrombocytopaenia (NAIT)	Blood Transfusion (LRI/LGH/GGH)	Maternal: 3 x 2.7mL EDTA + 2 x 4.9mL Serum Gel Paternal: 3 x 2.7mL EDTA Neonate: 1 x 1.2mL EDTA	7 days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3 Contact Filton lab to discuss crossmatch requirements

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Fibrinogen	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Newborn-1mnth: 1.1-3.1g/L Adult: 2.0-4.0g/L	Can be added onto samples up to 8 hours old
Fibrinogen	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	2.0 - 4.0g/L	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Special Clotting Screen H&T clinical approval is required prior to testing
Fibrinogen genetics	Special Haematology	Contact laboratory	6 weeks	N/A	Analysed at Addenbrooke's Hospital. Must be discussed with Haemostasis Consultant
FIPIL1-PDGFRa	Special Haematology	5 x 2.7mL EDTA OR 3 x 4.7mL Lithium Heparin	2 months	N/A	Analysed at Salisbury District Hospital Do NOT send samples on Friday
Flecainide (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	Non-toxic: 200-800µg/L Telephone Limit: >1000ug/L	For urgent requests, please contact Duty Biochemist on 0116 258 6560
Fluid (pleural, ascitic etc.) fluid immunophenotyping	Immunology	>1mL in sterile universal container	24 hours	N/A	
Fluid morphology: CSF	Special Haematology	0.5mL in sterile universal container	5 days	N/A	Samples should arrive in the laboratory before 3:30pm Contact Haematology clinician for advice

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Fluid morphology: Pleural/ascitic fluid	Special Haematology	~5mL in sterile universal container	5 days	N/A	Contact Haematology clinician for advice
Folate	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Deficient: 0.35 - 3.37 ug/L Indeterminate: 3.38 - 5.38 ug/L Normal: >5.38 ug/L	
Follicle Stimulating Hormone (FSH)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult Male: 1.4 – 18.1 iu/L Adult Female: Follicular phase: 2.5 – 10.2 iu/L Ovulatory phase: 3.4 – 33.4 iu/L Luteal phase: 1.5 – 9.1 iu/L Menopausal: 23.0 – 116.3 iu/L	State day of menstrual cycle
Follicular lymphoma t(14;18) confirmation	Special Haematology	4 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	10 working days	N/A	Analysed at Nottingham City Hospital
Fractional Excretion of Phosphate (FREP)	Routine Biochemistry (LRI/LGH/GH)	Random Urine in Sterile universal or fluoride bottle AND 1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0-20%	Require urine AND serum samples

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Free Fatty Acids (Paediatric)	Special Biochemistry	1 x 1.2mL Fluoride EDTA (Paediatric)	4-6 weeks	Interpretation provided on report	Not available to Primary Care Analysed at Sheffield Children's Hospital Hypoglycaemic sample required
Free T3 (FT3)	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <2 yrs: 5.1 – 8.0 pmol/L 2 - <13 yrs: 5.1 – 7.4 pmol/L 13 - <20 yrs: 4.7 – 7.2 pmol/L ≥ 20 yrs: 3.5 – 6.5 pmol/L Telephone Limit: ≥ 8.0 pmol/L	
Free T4 (FT4)	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <2 yrs: 11.7 – 18.3 pmol/L 2 - <13 yrs: 10.7 – 17.8 pmol/L 13 - <18 yrs: 10.3 – 18.1 pmol/L ≥ 18 yrs: 9.7 – 24.7 pmol/L Telephone Limit: ≤ 25 pmol/L (if hypothyroid) ≥ 50 pmol/L (if thyrotoxic)	
Fructosamine	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	151 -300 umol/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Full Blood Count (FBC)	Routine Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	See reference ranges for individual parameters	Consists of: White cell count Red cell count Haemoglobin Haematocrit Mean cell volume Mean cell haemoglobin Platelet count Neutrophil count Lymphocyte count Monocyte count Eosinophil count Basophil count
Functional C1 inhibitor	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	1 month	70-130% Alert <50% and Critical <30%	Sample should reach laboratory within 4 hours
FXIII assay	Special Haematology	1 x 4.3mL citrate	6 weeks	N/A	Analysed at Royal Hallamshire Hospital, Sheffield H&T clinical approval is required prior to testing
G					
Gabapentin	Special Biochemistry	1 x 4.9mL serum gel Minimum sample volume required: 100 µL	10 working days	Therapeutic range: 2 – 20 mg/L. (Baselt, Deposition of toxic drugs and chemicals in man)	For therapeutic monitoring purposes, a trough (before dose) sample should be taken.
Galactitol (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks	N/A	Not available to Primary Care Analysed at Bristol Southmead Hospital Interpretation provided
Galactosaemia Screen (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	5 working days	N/A	Not available to Primary Care Interpretation required

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Gamma-glutamyl Transferase (GGT)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <6 months: 8 – 143 U/L 6 months - <11 yrs: 7 – 33 U/L 11 - <19 yrs: 7 – 22 U/L ≥19 yrs:0 – 38 U/L Male: 0 - <6 months: 8 – 143 U/L 6 months - <11 yrs: 7 – 33 U/L 11 - <19 yrs: 9 – 31 U/L ≥19 yrs: 0 – 73 U/L	
Gastrin	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	4-6 weeks	Up to 40pmol/L	Part of gut hormone profile Sample to be received by laboratory within 15 minutes of collection. Stop H2 antagonists for 72 hours, Omeprazole for 2 weeks Analysed at Charing Cross Hospital
Genetic testing for primary immune deficiency: after discussion with Consultant Immunologist	Immunology	Various - contact laboratory	Variable	N/A	
Genetic Tests for Periodic Syndromes	Immunology	Various samples may be required	Variable	N/A	Any requests must be discussed with a consultant Immunologist
Gentamicin (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Telephone Limit: Pre-dose: ≥2mg/L Post dose: ≥10mg/L	Assay performed on behalf of Microbiology Contact Microbiology for advice (See UHL Microguide for guidance: https://viewer.microguide.global/UHL/Abx)

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Glandular Fever Screen (GF)	Routine Haematology (LRI ONLY)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	48 hours	N/A	
Glomerular basement membrane (GBM) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	1 day	0-19.9CU	Urgent results are telephoned
Glucagon	Special Biochemistry	Various - contact laboratory	4-6 weeks	Up to 50pmol/L	Part of gut hormone profile Analysed at Charing Cross Hospital
Glucose (CSF)	Routine Biochemistry (LRI ONLY)	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	2/3 plasma glucose result	Not available to Primary Care
Glucose (plasma)	Routine Biochemistry (LRI/LGH/GH)	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Fasting: 0 - <19 yrs: 3.6 – 5.8 mmol/L ≥19 yrs: 4.1 – 5.9 mmol/L Telephone Limits: ≤30 yrs: ≥10 mmol/L >30 yrs: ≥25 mmol/L	
Glucose (Fluid)	Routine Biochemistry (LRI)	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatrics) Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Glucose-6-Phosphate (G6PD) assay	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	15 working days	For reference ranges please refer to the report.	Analysed at King's College Hospital, London Send FBC and Reticulocyte results with sample Inform laboratory when sending sample
Glucose-6-Phosphate (G6PD) Screen	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	3 working days. 1 day on request	N/A	Request to be authorised by SpR/Clinical Scientist Can be requested on sample up to 5 days old if stored at 4°C
Glutamate Receptor Antibodies (AMPA1/2, GABA B)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Oxford Radcliffe Hospital
Glutamic acid decarboxylase (GAD) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	Positive≥10 IU/mL Negative <10 IU/mL	
Glycine Receptor Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	28 days	N/A	Analysed at Oxford Radcliffe Hospital
Glycosaminoglycans (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks		5mL urine required Available to Community Paediatricians Analysed at Nottingham University Hospitals Interpretation provided
Group (Neonatal <4 months)	Blood Transfusion (LRI/LGH/GGH)	1 x 1.6mL EDTA	24hours	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Group and screen (Adult)	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA "FOR BLOOD TRANSFUSION"	24hours (may be extended if patient has anomalous red cell antibodies)	N/A	See appendix 4 for valid group and screen sample criteria
Group and screen (Paediatric <10kg)	Blood Transfusion (LRI/LGH/GGH)	1 x 1.6mL EDTA	4hours (may be extended if patient has anomalous red cell antibodies)	N/A	See appendix 4for valid group and screen sample criteria
Growth Hormone	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	HGH release is pulsatile and very low random levels are not an indicator of deficiency. Performed primarily as part of DFT's which have respective specific reference ranges.	Not available to Primary Care Interpretation provided

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Gut Hormone Profile: Gastrin, glucagon, CART, pancreatic polypeptide, somatostatin, VIP, chromagranin A, chromogranin B	Special Biochemistry	3x EDTA bottles 2.7 mL, to lab within 15 mins of collection + 1 x serum bone profile and U&E	4-6 weeks	Gastrin: 0-40pmol/L Glucagon: 0-50 pmol/L CART: 0-85 pmol/L Pancreatic polypeptide 0-300 pmol/L Somatostatin: 0-150 pmol/L VIP: 0-30 pmol/L Chromogranin A: 0-60 pmol/L Chromogranin B: 0-150 pmol/L	Not available to Primary Care Sample to be received by laboratory within 15 minutes of collection Analysed at Charing Cross Hospital
H					
Haematocrit (Hct)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult (Male): 0.400 – 0.54 L/L Adult (Female): 0.370 – 0.47 L/L	Part of Full Blood Count
Haematological Malignancy Cytogenetics	Special Haematology (processed by cytogenetics laboratory)	5mL Bone marrow, heparinised culture medium (provided by cytogenetics)	28 days	N/A	Send to HMDL laboratory, NOT cytogenetics Cytogenetics form required – contact laboratory for advice
Haematological Malignancy FISH (CLL P53 status, AML, CML etc.)	Special Haematology (Processed by cytogenetics laboratory)	1 x 4.9mL Lithium Heparin	28 days	N/A	Send to HMDL laboratory, NOT cytogenetics

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Haematoncology tests	Immunology	2 x 2.7mL EDTA (2 x 1.2mL Paediatrics)	3 days	Adult (or age-specific for children) reference ranges are provided as appropriate for the examination performed.	Sample should reach laboratory within 48 hours Please ensure sample reaches laboratory before 16:30 on Fridays
Haemoglobin (Hb)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2 yrs: 95 – 140 g/L 2-6 yrs: 110 – 140 g/L 6-12 yrs: 115 – 145 g/L Adult (Male): 130 – 180 g/L Adult (Female): 115 – 165 g/L Telephone Limits: During core hours: <80g/L >220g/L Outside core hours: <60g/L >220g/L	Part of Full Blood Count

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Haemoglobinopathy Investigations	Special Haematology	1 x 2.7mL EDTA *Purple Top* (1 x 1.2mL Paediatrics)	3-40 days, dependent on complexity	N/A	Routine requests to: Genomic Laboratories Box 143, Level 6, ATC Addenbrooke's Hospital Cambridge CB2 0QQ Urgent requests to: Sample Reception (NW GLH),6th Floor, Saint Mary's Hospital, Oxford Road, Manchester, M13 9WL, United Kingdom" Cambridge: 01223 348866 Manchester: 0161 276 6553 mft.genomics@nhs.net
Haemoglobinopathy screen	Special Haematology	1 x 2.7ml EDTA *Purple Top* (1 x 1.2ml Paediatrics)	3 working days (7 working days if abnormality detected)	Hb A_2 1.9 - 3.4% Hb F 0.0 – 0.7%	MUST also request FBC (with additional 4.9mL EDTA sample) Screening can be performed on samples up to 2 days after phlebotomy if stored at room temperature or up to 7 days if stored at 4°C. Results may be misleading if the patient has ever received a bone marrow transplant, gene therapy, or if there has been a blood transfusion in the last four months.
Haemophilia A genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form
Haemophilia A/B carrier genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Haemophilia B genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form
Haemophilusinfluenzae type b (Hib) specific IgG level	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	16 days	Optimal protective level ≥1.00 mg/L (Minimal protective level ≥0.15 mg/L)	
Haptoglobin	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0.40 – 2.80 g/L	
HbA1c	Special Biochemistry (LRI ONLY)	1 x 2.7mL EDTA *Purple Top* (1 x 1.2mL Paediatrics)	3 working days	Normal: 20-41mmol/mol (4.0 – 5.9%) Diabetic: ≥48 mmol/mol Hb (≥6.5%)	
HbS Quantification	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	3 working days (1hr on request)	N/A	MUST also request FBC (with additional 4.9mL EDTA sample) Can be requested on sample up to 5 days old if stored at 4°C
hCG (total)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult: 0 - 5 iu/L Please note:- reference range for males and non-pregnant females	In Pregnancy: Variable with gestation

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Heparin (with instructions to send to Fastrack)	Routine Haematology (LRI/LGH/GH)	2 x 4.3mL citrate	Same day (2hrs on request)	See UHL Guidelines for Heparin and Oral Anticoagulant dosing	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM.
Heparin Induced Thrombocytopaenia (HIT)	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel	5 working days (1 working day if urgent)	N/A	Urgent samples must be discussed with laboratory before sending sample Send within 4 hours and it doesn't matter if sent in air tub
Heparin Induced Thrombocytopenia Screen (HIT)	Special Haematology	1 x 4.3mL gel sample	Same day		Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM See UHL Guidelines for Heparin Induced Thrombocytopenia (HIT) H&T clinical approval is required prior to testing
Histone antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Sent to Sheffield Teaching Hospitals NHS Fou ndation Trust.
HLA B27	Immunology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	2 days	N/A	Sample should reach laboratory within 48 hours Please ensure sample reaches laboratory before 16:30 on Fridays Equivocal results confirmed at Transplant Immunology, Leicester General Hospital.
HLA Specific Antibody Screen	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel	7 working days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
HLA Typing	Blood Transfusion (LRI/LGH/GGH)	3 x 2.7mL EDTA	5 working days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
HLA typing (full)	Blood Transfusion (LRI/LGH/GGH)	3 x 2.7mL EDTA	7 working days	N/A	Analysed at NHSBT and UHL Transplant Laboratory NHSBT form required – see link in Appendix 3 Contact laboratory if WBC below 2 x 109/L
HMGCR	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Oxford Radcliffe Hospital
Homocysteine	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	15 working days	4.0 to 16.0 umol/L	Not available to Primary Care Fasting sample sent to the laboratory within 30 minutes of collection Interpretation provided
Hydroxycarbazepine (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	15 working days	Non-toxic: 3-35 mg/L	
I					
IA2 antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	24 days	Positive≥10 IU/mL Negative <10 IU/mL	
IgA tissue transglutaminase (tTG) antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	Negative <7 U/mL Equivocal 7-10 U/mL Positive >10 U/mL	Patients with low response will be tested for tTG IgG antibody, immunoglobulins and serum electrophoresis
IgD	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 weeks	2-100 KU/L	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
IGF-1 (Paediatric)	Special Biochemistry	1 x 4.9mL serum (no gel separator) (Paediatric)	10 working days		Not available to Primary Care Contact laboratory (x16559) to discuss
IgG and IgA Gliadin antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
IgG and IgM anti-A and B levels	Blood Transfusion (LRI/LGH/GGH)	2 x 7.5mL EDTA for Blood Transfusion	7 days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
IgG and IgM Cardiolipin antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	0-20CU	
IgG Subclasses	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	Variable	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
IgG tissue transglutaminase (tTG) antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	0-7 U/mL- Negative 7-10 U/mL- Equivocal >10 U/mL- Positive	
IgG1	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	Cord Blood: 3.6 – 8.4. g/L 0-6mo 1.5 – 3.0 g/L 6mo-2yrs 2.3 – 5.8 g/L 2-5yrs 2.3 – 6.4 g/L 5-10yrs 3.6 – 7.3 g/L 10-15yrs 3.8 – 7.7 g/L Adult 3.2 – 10.2 g/L	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
IgG2	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	Cord Blood 1.2 – 4.0 g/L 0-6mo 0.3 – 0.5 g/L 6mo-2yrs 0.3 – 3.9 g/L 2-5yrs 0.7 – 4.5 g/L 5-10yrs 1.4 – 4.5 g/L 10-15yrs 1.3 – 4.6 g/L Adult 1.2 – 6.6 g/L	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
IgG3	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	Cord Blood 0.3 – 1.5 g/L 0-6mo 0.1 – 0.6 g/L 6mo-2yrs 0.1 – 0.8 g/L 2-5yrs 0.1 – 1.1 g/L 5-10yrs 0.3 – 1.1 g/L 10-15yrs 0.2 – 1.2 g/L Adult 0.2 – 1.9 g/L	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
IgG4	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	Cord blood <0.5 g/L 6 Months <0.5 g/L 2 Years <0.5 g/L 5 Years <0.8 g/L 10 Years <1.0 g/L 15 Years <1.1 g/L Adult <1.3 g/L	
Immunosorbent Allergen Chip (ISAC)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 weeks	<0.35 kU/L	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Indicans	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	10 working days		
Inhibitor Assay	Special Haematology	2 x 4.3mL citrate	2 weeks		Please Discuss with Laboratory H&T clinical approval is required prior to testing
Inhibitor Screen	Special Haematology	1 x 4.3mL citrate	2 weeks (4hrs on request)	N/A	Please Discuss with Laboratory H&T clinical approval is required prior to testing
Insulin Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Insulin	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	3.0 – 25.0 mU/L	Not available to Primary Care Prevailing blood glucose <2.5mmol/L required Interpret results as appropriate to prevailing glucose level
Insulin-Like Growth Factor (IGF1) (Adult)	Special Biochemistry	1 x 4.9mL serum gel	10 working days	For reference ranges, please contact the laboratory.	For paediatric samples, contact laboratory. Interpretation provided

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Insulin-Like Growth Factor (IGF1) (Paediatric) (18 y/o & less)	Special Biochemistry	1 x 4.9 serum (Paediatric)	10 working days	For reference ranges, please contact the laboratory.	Not available to Primary Care Contact laboratory
International Normalised Ratio (INR)	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 0.9-1.2 Telephone Limits: During core hours: >8.0 Outside core hours: >8.0	For monitoring warfarin dose ONLY Can be added onto samples up to 8 hours old
Intrinsic factor antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Iron	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 2.7 – 21.3 umol/L 1 - <14 yrs: 2.9 – 29.5 umol/L 14 - <19 yrs: 4.1 – 29.4 umol/L ≥19 yrs: 9.0 – 30.4 umol/L Male: 0 - <1 yrs: 2.7 – 21.3 umol/L 1 - <14 yrs: 2.9 – 29.5 umol/L 14 - <19 yrs: 7.7 – 34.2 umol/L ≥19 yrs: 11.6 – 31.3 umol/L	Sample to be taken 4 hours after ingestion
Iso-Electric Focussing	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	7 working days	N/A	Confirmatory test for abnormal haemoglobins identified in initial screen
Itraconazole (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 working days	Prophylaxis: Pre 0.5-4.0mg/L Therapy: Pre 1.0-4.0mg/L All pre-dose levels to be kept below 4.0mg/L	For further interpretation, contact microbiology
J					

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
JAK2 Exon 12	Special Haematology	2 x 2.7mL EDTA	14 working days	N/A	Analysed at Addenbrooke's Hospital, Cambridge
K					
Kleihauer (delivery)	Blood Transfusion (LRI/LGH/GGH)	Maternal: 1 x 7.5mL EDTA Newborn: 1 x 7.5mL EDTA (cord) or 1 x 1.2mL EDTA (heel prick sample)	72 hours from time of event	if any foetal cells are seen in 25 low power fields then a full count will be performed' Full foetal cell count will estimate size of bleed reported in mLs.	Maternal samples to be taken at least 30 to 45 minutes post event All positive results will be sent for confirmation by Flow Cytometry
Kleihauer (non-delivery)	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA	72 hours from time of event	if any foetal cells are seen in 25 low power fields then a full count will be performed' Full foetal cell count will estimate size of bleed reported in mLs.	All positive results will be sent for confirmation by Flow Cytometry
L					
Lacosamide (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	10-20 mg/L24 hour quantitation	Trough level preferable Analysed at TDM Unit, Epilepsy Centre, Chalfont St Peter.
Lactate	Routine Biochemistry (LRI ONLY)	1 x 2.7mL Fluoride EDTA (1.2mL Paediatrics)	1 hour	0.5 - 2.20 mmol/L Telephone Limit: ≥4.0mmol/L	Not available to Primary Care Transported to laboratory on ice To be received by laboratory within 30 minutes of collection

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Lactate (CSF)	Routine Biochemistry (LRI ONLY)	1 x 2.7mL Fluoride EDTA (1.2mL Paediatrics)	1 hour	CSF: 1.2 - 2.1 mmol/L	Not available to Primary Care Transported to laboratory on ice To be received by laboratory within 30 minutes of collection
Lactate (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	
Lactate Dehydrogenase (LDH)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Females 0 to <1 Year: 228 - 438 U/L 1 to <12 Years: 207 – 383 U/L 12 to <19 Years: 146 – 279 U/L >19 years: 120 - 246 U/L Males 0 to <1 Year: 228 - 438 U/L 1 to <12 Years: 207 – 383 U/L 12 to <19 Years: 136 – 293 U/L >19 years: 120 - 246 U/L	
Lactate Dehydrogenase (LDH) (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Measure serum and fluid protein/LDH simultaneously for Light's criteria, to differentiate exudate from transudate.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Lamotrigine (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	Non-toxic: 1.0-4.0mg/L Potentially toxic: 3 to 15mg/L Telephone Limit: >15mg/L	
Lead	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	15 working days	Usual/non-toxic: <0.5µmol/L Toxic - Industrial exposure: 0.5-1.4µmol/L, rpt in 12 months. 1.4-1.9µmol/L, rpt in 6 months. 1.9-2.9µmol/L, rpt in 3 months. Over 2.9µmol/L: employee unfit for work.	Analysed at Nottingham University Hospitals Lower values apply to women of reproductive age & children.
Levetiracetam (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	Non-toxic: 12-46 mg/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Lithium (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Non-toxic: 0.4-1.0mmol/L (> 0.8 mmol/L for acute Rx) Potentially toxic: >1.5mmol/L Telephone Limit: >1.5mmol/L	Sample 12 hours post dose. Avoid lithium heparin bottles.
Lipoprotein (a)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 working days	<32 nmol/L – low cardiovascular risk 32-90 nmol/L – minor increase in cardiovascular risk. 91-200 nmol/L – moderate increase in cardiovascular risk. >200 nmol/L – highly increased cardiovascular risk.	
LGI1 Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics	21 days	N/A	Analysed at Oxford Radcliffe Hospital
Lupus Screen	Special Haematology	2 x 4.3mL citrate	2 weeks	Batch specific- refer to report	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Thrombophilia Screen H&T clinical approval is required prior to testing

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Lupus sensitive APTT	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	Batch specific- refer to report	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Special Clotting Screen H&T clinical approval is required prior to testing
Luteinising Hormone (LH)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult Male:1.5 - 9.3 iu/L Adult Female: Follicular phase: 1.9 -12.5 iu/L Ovulatory phase: 8.7 - 76.3 iu/L Luteal phase: 0.5 - 16.9iu/L Menopausal: 15.9 – 54.0 iu/L -pre pubertal: <0.1iu/L	State day of menstrual cycle
Lymphocyte subsets (Suspected primary immunodeficiency)	Immunology	2 x 2.7mL EDTA (2 x 1.2mL Paediatrics)	3 days	Refer to report for age-related reference ranges	Sample should reach laboratory within 48 hours Please ensure sample reaches laboratory before 16:30 on Fridays

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Lymphocytes	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-3 yrs: 4.0 – 13.5 x 10^9/L 3-6 yrs: 2.0 – 9.5 x 10^9/L 6-12 yrs: 1.5 – 6.5 x 10^9/L 12-15 yrs: 1.5 – 6.0 x 10^9/L Adult: 1.0 – 4.0 x 10^9/L	Part of Full Blood Count
M					
Magnesium (serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <1 yrs: 0.77 – 1.05 mmol/L 1 - <19 yrs: 0.69 – 0.92 mmol/L ≥ 19 yrs: 0.70 -1.00 mmol/L Telephone Limit: ≤ 0.4 mmol/L	
Magnesium (urine)	Special Biochemistry	24 hour urine (no preservative) OR Random Urine in Sterile universal.	15 working days	3 – 5 mmol/24hrs	Analysed at Nottingham University Hospitals
Malaria and/or other Parasite Investigations	Routine Haematology (LR/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	24 hours	N/A	Consists of rapid diagnostic test (LRI ONLY) and blood film Parasitaemia provided on falciparum and knowlesi species May require clinical comment Can be added onto samples up to 2 hours old

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Mannose-binding lectin (MBL)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
Mast cell tryptase	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	2-14 µg/L 2-44.3 µg/L post mortem	
Mean Cell Haemoglobin (MCH)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-12 yrs: 25.0 – 32.0 pg Adult: 27.0 – 32.0 pg	Part of Full Blood Count
Mean Cell Volume (MCV)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2 yrs: 74–95 fL 2-6 yrs: 70–95 fL 6-12 yrs: 77–95 fL Adult: 80–99 fL	Part of Full Blood Count
Meningococcal polysaccharide serogroup A, W135 & Y-specific IgG levels and serum bactericidal titres	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 months	Protective serum bactericidal activity titre ≥ 8	Analysed at HPA Meningococcal Reference Laboratory, Manchester
Meningococcal polysaccharide serogroup C-specific IgG levels and serum bactericidal titres	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3 months	Protective serum bactericidal activity titre ≥ 1:8	Analysed at HPA Meningococcal Reference Laboratory, Manchester Patient must not take antibiotics prior to sample collection

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Metabolic Screen: Glycosaminoglycans, amino acids, organic acids	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks	N/A	Available to Community Paediatricians Can all be performed on 1 sample, but at least 10-15mL urine required Analysed at Sheffield Children's Hospital Interpretation provided
Metadrenaline	Special Biochemistry	24 hour urine (adults) or random urine (paediatric)	15 working days	Adult: <1.0µmol/24 hours	
Methanol	Special Biochemistry	1 x 2.7mL Fluoride EDTA	5 working days	Severe toxicity: >50mg/100mL Telephone Limit: Phone ALL results	Analysed at Birmingham City Hospital Not available to Primary Care.
Methotrexate (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Minimum Cytotoxic Conc. >0.01umol/L Potentially Toxic Conc: >5.00umol/L 24hr Post High Dose	Methotrexate therapeutic levels will depend on the dosing protocol. Its toxicity is a function of both the concentration and the duration of exposure, and is affected by impaired renal function, pleural effusion, ascites and G.I. obstruction Contact pharmacy for interpretation
Microalbumin	Routine Biochemistry (LRI ONLY)	1 x 9ml Vacutest Kima white top tube	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0-3.5mg/mmol creat Male: 0-2.5mg/mmol creat	
Mitochondrial M2 antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
MOG Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Oxford Radcliffe Hospital
Monocyte count	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult 0.2 – 0.8 x 10^9/L	Part of Full Blood Count
MPL mutation analysis	Special Haematology	4 x 2.7mL EDTA	15 working days	N/A	Analysed at Addenbrooke's Hospital, Cambridge
Mucopolysacharide Screen (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks		Available to Community Paediatricians Analysed at Nottingham University Hospitals Interpretation provided
MuSK antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	28 days	N/A	Analysed by Oxford Radcliffe Hospital.
Myocardial antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust
Myositis Profile	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	N/A	Analysed at Nottingham University Hospitals NHS Trust
N					

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Neonatal Alloummune Neutropaenia (NAIN)	Blood Transfusion (LRI/LGH/GGH)	Maternal: 1 x 7.5mL EDTA 'for blood transfusion & 2 x 4.9mL Serum Gel Paternal: 1 x 7.5mL EDTA 'for blood transfusion Neonate: 1 x 1.2mL EDTA (Paediatrics)	14 working days 21 working days if further investigations required	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Neuronal antibodies (IFA)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Nottingham University Hospitals NHS Trust.
Neuronal antibodies (Immunoblot)	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Nottingham University Hospital NHS Trust
Neurone Specific Enolase (Paediatric)	Special Biochemistry	1 x 4.9 mL Serum Gel	4-6 weeks	5-25 mg/L	Not available to Primary Care Analysed at Kings College Hospital
Neutrophil oxidative burst test (DHR)	Immunology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics) Requires a transport control sample to be sent with patient sample.	3 days	>90% response (>2 log change in median fluorescence intensity with sharp peak)	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Neutrophils	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2 yrs: 1.0 – 8.5 x 10^9/L 2-6 yrs: 1.5 - 8.5 x 10^9/L 6-12 yrs: 1.5 – 8.0 x 10^9/L 12-15 yrs: 1.8 – 8.0 x 10^9/L Adult: 1.5 – 7.5 x 10^9/L Telephone Limits: During core hours: <1 x 10^9/L* >30.0 10^9/L Outside core hours: <0.5 x 10^9/L >50 x 10^9/L	Part of Full Blood Count * If neutropaenia consistent with chemotherapy, will only be phoned if neutrophils <0.5$10^9$/L
NMO/Aquaporin 4 Antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed by Oxford Radcliffe Hospital..
NMDA	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 days	N/A	Analysed at Nottingham University Hospitals NHS Trust
Normetadrenaline	Special Biochemistry	24 hour urine (adults) or random urine (paediatric)	15 working days	Adult: <3.0 µmol/24 hours	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
O					
Oligoclonal Banding	Immunology	Plain Universal for CSF AND 1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	3-4 weeks (faster if urgent)	N/A	Not available to Primary Care Interpretation provided
Osmolality	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics) OR Random Urine in Sterile universal or fluoride bottle	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	275-295 mOsm/kg (serum)	Dependent on hydration status
Ovarian antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Oxalate	Special Biochemistry	24 hour urine acidified (2M HCl) OR Random Urine in Sterile universal or fluoride bottle (Paediatrics)	4-6 weeks	1-16yr: 0.09-0.40mmol/24hr Male: 0.1-0.41mmol/24hr Female: 0.04-0.31mmol/24hr 0-1yr: 15-260µmol/mmol creatinine 1-5yr: 11-120µmol/mmol creatinine 5-12yr: 6-150µmol/mmol creatinine >12yr: 2-83µmol/mmol creatinine	Analysed at University College London Hospitals
Oxcarbazepine (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	N/A	See Hydroxycarbazepine monitoring (active metabolite)
P					
Paediatric ALL MRD	Special Haematology	4 x 2.7mL EDTA (blood) OR 2 x 2.7mL EDTA BONE MARROW	14 days	N/A	Analysed at Royal Hallamshire Hospital, Sheffield
Paediatric APML MRD	Special Haematology	2 x 2.7mL EDTA BONE MARROW	14 days	N/A	Analysed at Sheffield Children's Hospital

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Paediatric thrombophilia screen	Special Haematology	Discuss with laboratory	1 month	N/A	Analysed at Great Ormond Street Hospital, London Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Paediatric trephines	Special Haematology	Trephine core in 10% Saline Formalin	15 working days	N/A	
Paracetamol (Acetaminophen)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Therapeutic range: 10-20 mg/L Telephone Limit: All detectable levels	For guidance on paracetamol overdose management, please refer to UHL Trust protocol B43/2020 https://shorturl.at/jkpR4 Anticonvulsants and alcohol abuse increase susceptibility to poisoning. Risk of hepatoxicity depends on time from ingestion. See current edition of BNF.
Paraprotein Characterisation	Immunology	Serum gel tube or 20mL early morning urine sample (plain [white-capped] sterile universal without boric acid)	5 days	N/A Telephone Limits: IgG >30g/L IgA/M >20g/L IgM >20g/L All new IgD and IgE paraproteins.	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Parathyroid Hormone (PTH)	Routine Biochemistry (LRI ONLY)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	1.95-8.49 pmol/L	Concurrent calcium result needed to interpret PTH result
Paroxysmal Nocturnal Haemoglobinuria (PNH)	Immunology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	3 days	New PNH clones that are >5% will be telephoned to the requesting clinician.	Samples must be received by the Immunology laboratory within 48 hours of collection.
Pemphigoid (skin) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Immunodermatology, St Thomas Hospital
Pemphigus (skin) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	14 days	N/A	Analysed at Immunodermatology, St Thomas Hospital
Peripheral blood morphology (suspected haematological malignancy or medical comment)	Special Haematology	Blood film OR 1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	5 days (6hrs if urgent)	N/A	Medical comment provided following referral from routine haematology laboratory In suspected malignancy cases, current FBC results must be provided on HMDL request form
Phenobarbitone (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Non-toxic: 10-40mg/L Potentially toxic: ≥50mg/L Telephone Limit: ≥70mg/L	Tolerance develops with chronic dosage

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Phenytoin (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Therapeutic range: 10.0 – 20.0 mg/L Telephone Limit: ≥25mg/L	
Phosphate (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <1 yrs: 1.55 – 2.49 mmol/L 1 - <5 yrs: 1.36 – 2.07 mmol/L 5 - <14 yrs: 1.29 – 1.87mmol/L 14 - <19 yrs: 0.97 – 1.71 mmol/L ≥ 19 yrs: 0.80 - 1.50 mmol/L Telephone Limits: ≤0.3mmol/L	
Phosphate (urine)	Routine Biochemistry (LRI ONLY)	24 hour urine acidified (2M HCl) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr urine: 12.9 – 42.0 mmol/24hr	
Phytanic Acid (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	4-6 weeks	0.2-19.3 umol/L	Not available to Primary Care Part of very long chain fatty acid profile Analysed at Sheffield Children's Hospital
Plasma Viscosity (PV)	Routine Haematology (LRI ONLY)	1 x 2.7mL EDTA *Purple Top* (1 x 1.2mL Paediatrics)	24 hours	Adult: 1.50 – 1.72 cp	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Plasminogen	Special Haematology	1 x 4.3mL citrate	3 weeks	N/A	Analysed at UCL, London H&T clinical approval is required prior to testing
PLA2 antibody and quantitation	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	<14 RU/mL - Negative	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Platelet Count	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 140 – 400 x 10^9/L Telephone Limits: During core hours: <20 x 10^9/L >1000 x 10^9/L Outside core hours: <20 x 10^9/L >1000 x 10^9/L	Part of Full Blood Count
Platelet Function Studies	Special Haematology	Sample bottles only available from Haemostasis Clinic	Same day	N/A	Please Discuss with Laboratory

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Platelet Function Test	Blood Transfusion (LRI/LGH/GGH)	2 x 1.6mL r-Hirudin Bottles	Urgent – 30 minutes from sample receipt but they must contact BT prior to sample collection. Routine - 3 hours from sample receipt	ADP - 70 - 124 U ASPI - 84 - 130 U TRAP - 121 - 165 U	Blood bottles to be collected from laboratory. Blood from CVP line or peripheral venous line with caution to avoid prolonged venous stasis and using a large-bore needle during draw. Fill to the indicated fill volume (within +/-10% of thick black line). Gently invert the collection tube to mix. (DO NOT SHAKE). DO NOT take arterial blood sample. For drawing blood during surgery, use the side port of the central venous catheter to approximate results obtained with peripheral blood. Use Blood Track to label the sample. The sample should reach the laboratory within half an hour by hand delivery and NOT via the airtube system. Use the ORANGE coloured racks provided for Platelet Function testing for transport ONLY. Store the sample at room temperature in pre-examination phase. DO NOT freeze, refrigerate or heat the samples.

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Platelet Glycoprotein Estimation	Blood Transfusion (LRI/LGH/GGH)	Variable	7 days	N/A	Contact laboratory before collecting samples Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Platelet glycoproteins	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	24 hours	N/A	Analysed at Birmingham Children's Hospital MUST contact the laboratory before samples are taken H&T clinical approval is required prior to testing
Platelet Refractoriness	Blood Transfusion (LRI/LGH/GGH)	3 x 2.7mL EDTA AND 2 x 4.9mL Serum Gel	Up to 21 days, depending upon donor availability	N/A	Sample sent to NHSBT NHSBT form required – see link in Appendix 3
Platelet Refractoriness	Blood Transfusion (LRI/LGH/GGH)	2 x 4.9mL Serum Gel	Up to 21 days, depending upon donor availability	N/A	
Pneumococcal polysaccharide serotype-specific IgG levels	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 weeks	>=0.35 mg/L	Analysed at Addenbrookes Hospital, Cambridge
Porphobilinogen quantitation	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics) OR 1 x 4.9mL Heparin (1.2mL Paediatric)	5 weeks	PBG:Creat ratio: 0 to 1.5 umol/mmol	Protect samples from light Analysed at University Hospitals of Wales
Porphobilinogen screen	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	5 working days	N/A	Protect samples from light Fresh urine

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Porphyria screen (acute)	Special Biochemistry	Urine, preferably early morning AND 3 x 2.7mL EDTA AND faecal sample (ONLY if past/family history of porphyria)	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyria screen (cutaneous/bullous)	Special Biochemistry	Urine, preferably early morning AND 3 x 2.7mL EDTA	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyria screen (erythropoietic/photosensitive)	Special Biochemistry	3 x 2.7mL EDTA	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyria screen (pseudoporphyria with cutaneous symptoms)	Special Biochemistry	3 x 2.7mL EDTA AND faecal sample	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Porphyria monitoring (acute intermittent porphyria/variegate or hereditary coproporphyria/porphyria cutanea tarda)	Special Biochemistry	Urine, preferably early morning	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyria monitoring (erythropoetic protoporphyria)	Special Biochemistry	3 x 2.7mL EDTA	5 working days	N/A	Protect samples from light Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyrins screen (faecal)	Special Biochemistry	Faecal sample	5 working days	N/A	Protect samples from light Fresh sample required Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Porphyrins screen (total & plasma)	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics) OR 1 x 4.9mL Heparin (1.2mL Paediatric)	5 working days	N/A	Protect samples from light Fresh sample required Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Porphyrins screen (urine)	Special Biochemistry	Random urine in sterile universal of fluoride bottle	5 working days	N/A	Protect samples from light Fresh sample required Please provide details of presenting symptoms and relevant family/past medical history. When supplying family details, please indicate type of porphyria, dates of birth and relationship to patient
Posaconazole (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 working days	Prophylaxis: Pre 0.7-3.75 mg/L Therapy: Pre 1.0-3.75 mg/ All pre-dose levels to be kept below 3.75mg/L	For further interpretation, contact microbiology
Post Transfusion Purpura (PTP)	Blood Transfusion (LRI/LGH/GGH)	3 x 2.7mL EDTA AND 2 x 4.9mL Serum Gel	7 days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Potassium (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics) OR 24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	< 28 days: 3.4-6.0 mmol/L 28 days - 12 months: 3.5-5.7 mmol/L 1 - 15 yrs: 3.5-5.0 mmol/L ≥ 16 yrs: 3.5-5.3 mmol/L Telephone Limits: Neonates (<28 days): ≥ 6.9mmol or ≤ 2.5mmol/L ≥ 28 days old: ≥ 6.0mmol/L or ≤ 2.5mmol/L ≥ 6.5mmol/L (GP and outpatients out of hours)	
Potassium (Urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Urine: 25 - 125 mmol/24hr	
Pregabalin	Special Biochemistry	1 x 4.9mL serum gel Minimum sample volume required: 100 µL	10 working days	Therapeutic range: 2 – 5 mg/L (Baselt, Deposition of toxic drugs and chemicals in man)	For therapeutic monitoring purposes, a trough (before dose) sample should be taken.
Primidone (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)		N/A	See Phenobarbitone monitoring (active metabolite)

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Pristanic Acid (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	4-6 weeks	0-1.88 mmol/L	Not available to Primary Care Part of very long chain fatty acid profile Analysed at Sheffield Children's Hospital
Pro-calcitonin (PCT)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	Inpatients – 3 hours	<0.05 ng/mL	
Pro-collagen peptide I	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	4-6 weeks	Males : 22-87 mg/L Female (pre-menopausal) 19-83 mg/L Female (post-menopausal) 16-96 mg/L	Analysed at Nottingham University Hospitals.
Pro-collagen peptide III (P3NP)	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	2.4-8.7ug/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Progesterone	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: Day 21 progesterone: > 30 nmol/L probably Ovulatory < 20 nmol/L probably Non Ovulatory 20-30 nmol/L Equivocal Male: 0.2-1.9 nmol/L	State day of menstrual cycle Day 21 sample required for assessing ovulation
Prolactin	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Male: 45- 375 mIU/L Female: 59 - 619 mIU/L Telephone Limits: ≥5000 mIU/L	
Prostaglandin D2	Immunology	5mL urine no preservative.	28 days	0 - 825ng/mmol creatinine.	Analysed at Northern General Hospital Sheffield. 24hour collection advised if investigating MCAS
Prostaglandin DM	Immunology	5mL urine no preservative 24hour collection advised if investigating MCAS	28 days	0 - 2300 ng/mmol creatinine.	Analysed at Northern General Hospital Sheffield 24hour collection advised if investigating MCAS
Prostaglandin F2 ALPHA	Immunology	5mL urine no preservative.	28 days	0 - 105ng/mmol creatinine.	Analysed at Northern General Hospital Sheffield 24hour collection advised if investigating MCAS

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Prostate Specific Antigen (PSA)	Routine Biochemistry (LRI)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - 49 yrs: 0.0 - 2.5 ug/L 50 - 59 yrs: 0.0 - 3.5 ug/L 60 - 69 yrs: 0.0 - 4.5 ug/L 70 - 79 yrs: 0.0 - 6.5 ug/L Over 80 yrs: 0.0 - 20.0 ug/L	See NICE guideline NG12
Protein (CSF)	Routine Biochemistry (LRI ONLY)	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatric)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0.15 – 0.45 g/L	Not available to Primary Care
Protein (Total) (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	Measure serum and fluid protein/LDH simultaneously for Light's criteria, to differentiate exudate from transudate.
Protein (Total) (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	57 – 82 g/L	Part of liver function and bone profile tests

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Protein (Urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Random Urine: 0.01 – 0.14 g/L 24hr Urine: 0.00 - 0.15 g/24hr Protein/creatinine ratio: ≤ 30 mg/mmol	
Protein C	Special Haematology	2 x 4.3mL citrate	2 weeks	69 - 128%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Thrombophilia Screen H&T clinical approval is required prior to testing
Protein S	Special Haematology	2 x 4.3mL citrate	2 weeks	Female: 53 -128% Male: 71 - 165%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Thrombophilia Screen Not tested during pregnancy H&T clinical approval is required prior to testing
Prothrombin gene mutation	Special Haematology	2 x 2.7mL EDTA OR 1 x 4.3mL Citrate	14 working days	N/A	Analysed at QMC, Nottingham

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Prothrombin Time (PT)	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Newborn-1mnth: 14.0-16.0s Adult: 11.0-14.0s	Reported with INR Can be added onto samples up to 8 hours old H&T clinical approval is required prior to testing
Prothrombin Time (PT)	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	12 – 15 secs	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Special Clotting Screen
Purine/Pyramidine metabolism defects	Special Haematology	5 x 2.7mL EDTA	3 weeks	N/A	Analysed at St Thomas Hospital, London Contact Haematology clinician for advice
Purines (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks		Not available to Primary Care Fresh sample required Analysed at St Thomas' London. Interpretation provided
Pyrimidine-5-Nucleotidase	Special Haematology	2 x 2.7mL EDTA	3 weeks	N/A	Analysed at St Thomas Hospital, London
Pyruvate (Paediatric)	Special Biochemistry	Various	5 working days	Fasting: 41-91 mmol/L Postpradial: 41-114 mmol/L	Not available to Primary Care Contact laboratory (x6559) to discuss

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Pyruvate Kinase Screen	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	10 working days	N/A	Analysed at King's College Hospital, London Send FBC and Reticulocyte results with sample Inform laboratory when sending sample Contact Haematology clinician for advice
R					
Red Blood Cell Count (RBC)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2 yrs: 3.90–5.50 x 10^{12}/L 2-6 yrs: 3.70–5.50 x 10^{12}/L 6-12 yrs: 3.90–5.50 x 10^{12}/L Adult (Male): 4.50–6.50 x 10^{12}/L Adult (Female): 3.90–5.60 x 10^{12}/L	Part of Full Blood Count
Red cell allo-antibody identification - complex	Blood Transfusion (LRI/LGH/GGH)	2 x 7.5mL EDTA 'for blood transfusion'	7 days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Reducing Substances (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle OR Faeces	5 working days (urine) 10 working days (faeces)	N/A	Available to Community Paediatricians Urine or faecal sample must reach laboratory on da of collection Minimum 1.0g in occult pot. Analysed at Nottingham University Hospitals Interpretation provided

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Renin	Special Biochemistry	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Sample must be received by laboratory within 3 hours of collection Send with aldosterone Interpretation provided
Reptilase Time	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 16.0-18.0s	Requested by laboratory in suspected cases of heparin contamination
Reticulocyte Count	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	Adult: 20 – 80 10^9/L	Can be added to samples <24 hours old Reported with CHr
Reticulocyte Haemoglobin Content (CHr)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours N/A	Adult: 29 – 34 pg	Can be added to samples <24 hours old Reported with reticulocyte count Not suitable for patients with thalassaemia

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Retinal antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at the Institute of Neurology and Neurosurgery, Queens Square, London
Rheumatoid factor	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	2 days	0-12.5 IU/mL	
Ristocetin Co-factor	Special Haematology	2 x 4.3mL citrate	4 weeks (2hrs on request)	44.6- 138.6%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of von Willebrand Screen H&T clinical approval is required prior to testing
Ristocetin Induced Platelet Aggregation	Special Haematology	2 x 4.3mL Citrate	4 weeks	1.0 - 1.25mg/mL	Sample requirement H&T clinical approval is required prior to testing
RNA Polymerase III antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
S					
SAA	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	1 month	82% people <5mg/L 96 %< 10mg/L	Analysed at National Amyloidosis Centre, London

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Salicylate	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Therapeutic/non-toxic: ≤100 mg/L Toxic: ≥300mg/L Telephone Limit: ≥300mg/L	Levels may continue to rise after gastric lavage.
Selenium	Special Biochemistry	1 x 10 mL serum (no gel separator) (1 x 1.2mL Paediatric)	10 working days	Term infants (37-42 weeks): 0.26-0.88 µmol/L Less than 18 months: 0.33-0.97 µmol/L 18 months – 3 years: 0.51-1.12 µmol/L 4 - 18 years: 0.60-1.29 µmol/L Adults (19-64 y): 0.75-1.46 µmol/L Adults (65+ y): 0.66-1.57 µmol/L	Analysed at Nottingham University Hospitals
Serum free light chain quantitation	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	Serum free kappa: 3.3-19.4 mg/L Serum free lambda: 5.71-26.3 mg/L Kappa / lambda ratio: 0.26-1.65 Telephone Limits: >1000mg/L for either Serum free Kappa or Serum Free Lambda	
Serum protein electrophoresis	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 days	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Sex Hormone Binding Globulin (SHBG)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Females: 16 - <21 yrs:19.4 – 161.8 nmol/L 21 - <50 yrs: 17.7 – 138.3 nmol/L ≥ 50 yrs: 23.7 – 110.6 nmol/L Males: 16 - <21 yrs:11.1 – 49.8 nmol/L 21 - <50 yrs: 11.5 – 54.5 nmol/L ≥ 50 yrs: 17.3 – 71.5 nmol/L	
Sickle Solubility Test	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	3 working days (1hr on request)	N/A	MUST also request FBC (with additional 4.9mL EDTA sample)
Sodium (serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Adult: 133-146 mmol/L Telephone Limit: Adult: ≤120 mmol/L ≤16 years: ≤130 mmol/L All ages: ≥150 mmol/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Sodium (urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr Urine: 40 – 220 mmol/24hr	
Soluble CD25	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	26 days	0-2500pg/ml	Analysed at London GOSHH Immunology
Special Clotting Screen: PT, factor/lupus sensitive APTT, fibrinogen, thrombin time	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	N/A	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM H&T clinical approval is required prior to testing
Steroid Profile (Urine)	Special Biochemistry	24 hour urine	4-6 weeks	N/A	Gives analysis of adrenal gonadal steroids with interpretation Analysed at Kings College Hospital
Striated Muscle antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Sugar Chromotography (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle OR Faeces	15 working days	N/A	Available to Community Paediatricians Urine or faecal sample must reach laboratory on da of collection Minimum 1.0g in occult pot. Analysed at Nottingham University Hospitals Interpretation provided
Sulphatide antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	28 days	N/A	Analysed at the Institute of Neurology and Neurosurgery, Queens Square, London

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Sweat Test	Special Biochemistry	N/A	3 working days	N/A	Not available to Primary Care For routine appointments, send request form to Special Biochemistry. The laboratory will organise an appointment through a weekly clinic. For urgent tests, contact laboratory (x6559)
T					
Testosterone	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0.5-2.6 nmol/L Male: 9.0-34.7 nmol/L	
Tetanus toxoid-specific IgG level	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	16 days	Optimal protective level ≥0.15 IU/mL Minimum protective level ≥0.01 IU/mL	
Theophylline (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Non-toxic: 10-20mg/L Potentially toxic: >20mg/L Telephone Limit: ≥25mg/L	To exclude toxicity both trough and peak sampling may be required
Thrombin Time	Special Haematology	1 x 4.3mL citrate	Same day (1hr on request)	15 – 18secs	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of Special Clotting Screen H&T clinical approval is required prior to testing

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Thrombin Time (TT)	Routine Haematology (LRI/LGH/GH)	1 x 4.3mL Citrate 1 x 1.8mL (A&E ONLY) (1 x 1.4mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours N/A	Newborn-1mnth: 14.0-21.0s Adult: 15.0-18.0s	Can be added onto samples up to 8 hours old
Thrombophilia Screen: Lupus anticoagulant , antithrombin, protein C and protein S	Special Haematology	4 x 4.3mL citrate	2 weeks	N/A	Requests to be authorised by clinical staff H&T clinical approval is required prior to testing
THSD7A	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	Analysed at Sheffield Teaching Hospitals NHS Foundation Trust.
Thyroglobulin	Routine Biochemistry (LRI ONLY)	1 x 10mL serum (no gel separator) (1 x 1.2mL Paediatric)	4-6 weeks	N/A	Interpretation provided
Thyroid peroxidase antibody	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	4 days	<25- Negative 25-35 Equivocal >35 Positive	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Thyroid Stimulating Hormone (TSH)	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	0 - <19 yrs: 0.65 – 4.41 mIU/L ≥ 19 yrs: 0.55 – 4.78 mIU/L Telephone Limit: ≥ 50 mIU/L (if hypothyroid) ≤ 0.05 mIU/L (if thyrotoxic)	
Tobramycin (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Telephone Limits: Pre-dose/trough: ≥1mg/L Post dose: ≥12 mg/L	Assay performed on behalf of Microbiology Contact Microbiology for interpretation (See UHL Microguide for guidance: https://viewer.microguide.global/UHL/Abx)
Topiramate (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	Non-toxic: 5-20 mg/L	
Total IgE	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	7 days	New born 0-5 kU/L 3 months 0-11 kU/L 1 year 0-29 kU/L 5 years 0-52 kU/L 10 years 0-63 kU/L 15 years 0-75 kU/L Adult 0-81 kU/L	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Total immunoglobulin levels IgA	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	2 days	0-2 weeks 0.01-0.08g/L 2-6 weeks 0.02-0.15g/L 6-12 weeks 0.05-0.4g/L 3-6 months 0.1-0.5g/L 6-9 months 0.15-0.7g/L 9-12 months 0.2-0.7g/L 1-2 yrs 0.3-1.2g/L 2-3 yrs 0.3-1.3g/L 3-6 yrs 0.4-2.0g/L 6-9 yrs 0.5-2.4g/L 9-12 yrs 0.7-2.5g/L 12-15yrs 0.8-2.8g/L 15-45 yrs 0.8-2.8g/L >45yrs 0.8-4.0g/L	Patients with newly identified panhypogammaglobulinaemia will automatically be tested for serum immunofixation

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Total immunoglobulin levels IgG	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	2 days	0-2 weeks 5.0-17.0 g/L 2-6 weeks 3.9-13.0 g/L 6-12 weeks 2.1-7.7g/L 3-6 months 2.4-8.8g/L 6-9 months 3.0-9.0 g/L 9-12 months 3.0-10.9g/L 1-2 yrs 3.1-13.8g/L 2-3 yrs 3.7-15.8g/L 3-6 yrs 4.9-16.1g/L 6-9 yrs 5.4-16.1g/L 9-12 yrs 5.4-16.1g/L 12-15yrs 5.4-16.1 g/L >15yrs: 6.0-16.0g/L	Patients with newly identified panhypogammaglobulinaemia will automatically be tested for serum immunofixation

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Total immunoglobulin levels IgM	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	2 days	0-2 weeks 0.05-0.2g/L 2-6 weeks 0.08-0.4 g/L 6-12 weeks 0.15-0.7 g/L 3-6 months 0.2-1.0 g/L 6-9 months 0.4-1.6 g/L 9-12 months 0.6-2.1 g/L 1-2 yrs 0.5-2.2 g/L 2-3 yrs 0.5-2.2 g/L 3-6 yrs 0.5-2.0 g/L 6-9 yrs 0.5-1.8 g/L 9-12 yrs 0.5-1.8 g/L 12-15yrs 0.5-1.9 g/L 15-45yrs 0.5-1.9 g/L >45yrs 0.5-2.0 g/L	
Total Metanephrine	Special Biochemistry	24 hour urine (adults) or random urine (paediatric)	15 working days	Adult: <3.7µmol/24 hours	
TPMT (thiopurine methyl transferase)	Special Biochemistry	4.9 mL EDTA	4-6 weeks	Interpretation provided	Not available to Primary Care Analysed at City Hospital Birmingham

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Transferrin	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 1.68 – 3.42 g/L 1 - <12 yrs: 2.14 – 3.07 g/L 12 - <19 yrs: 2.35 – 3.63 g/L ≥19 yrs: 2.50 – 3.80 g/L Male: 0 - <1 yrs: 1.68 – 3.42 g/L 1 - <12 yrs: 2.14 – 3.07 g/L 12 - <19 yrs: 2.35 – 3.63 g/L ≥19 yrs: 2.15 – 3.65 g/L	
Transferrin Saturation	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	20-55%	
Transfusion Reaction Investigations	Blood Transfusion (LRI/LGH/GGH)	6 x 2.7mL EDTA post transfusion AND 3 x 2.7mL EDTA pre-transfusion AND lines/remnants from Units	14 days	N/A	If concern of Transfusion-Associated Graft Versus Host Disease (TA-GVHD), discuss with H&I Consultant Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Transfusion Related Acute Lung Injury (TRALI)		Pre-transfusion serum sample AND 2 x 4.9mL Serum Gel AND 3 x 2.7mL EDTA	14 days	N/A	Donation numbers of all blood products transfused < 24hrs before event required Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
Triglycerides	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/ Inpatients – 3 hours Outpatient/routine GP – 24 hours	0.0 - 1.70 mmol/L Telephone Limit: ≥ 20mmol/L	Must fast for 12-16 hours before sample collection
Triglycerides (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	
Troponin	Routine Biochemistry (LRI/GH)	1 x 4.9mL Heparin (1 x 1.2mL Paediatric)	1 hour	For interpretation of result see UHL Policy and Guidelines Document Number B41/2016:Non-Specific Chest Pain in Adults Investigation Pathway Telephone limit: ≥100ng/L Increase/decrease of ≥3ng/L	Not available to Primary Care. If GP suspects coronary event, send patient to A&E immediately

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
T-Spot	Immunology	2 x 4.9mL lithium-heparin	7 days		Analysed at Oxford Diagnostic Laboratories
TSH receptor antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	N/A	
U					

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Urate (Uric Acid) (serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 95 – 351 umol/L 1 - <12 yrs: 131 – 333 umol/L 12 - <19 yrs: 172 – 404 umol/L ≥19 yrs: 140 – 360 umol/L Male: 0 - <1 yrs: 95 – 351 umol/L 1 - <12 yrs: 131 – 333 umol/L 12 - <19 yrs: 172 – 494 umol/L ≥19 yrs: 200 – 430 umol/L	
Urate (Uric Acid) (urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr Urine:1.48 – 4.43 mmol/24hr	
Urea (Fluid)	Routine Biochemistry (LRI)	Plain sterile white top universal container	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	N/A	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Urea (Serum)	Routine Biochemistry (LRI/LGH/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Female: 0 - <1 yrs: 1.4 – 6.4 mmol/L 1 - <10 yrs: 3.2 – 7.9 mmol/L 10 - <19 yrs: 3.2 – 6.4 mmol/L ≥19 yrs: 2.5 – 7.8 mmol/L Male: 0 - <1 yrs: 1.4 – 6.4 mmol/L 1 - <10 yrs: 3.2 – 7.9 mmol/L 10 - <19 yrs: 3.9 – 7.5 mmol/L >19 yrs: 2.5 – 7.8 mmol/L Telephone limits: ≥30mmol/L (>16yrs) ≤10mmol/L (<16yrs)	
Urea (Urine)	Routine Biochemistry (LRI ONLY)	24 hour urine (no preservative) OR Random Urine in Sterile universal.	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	24hr Urine: 430 - 710 mmol/24hr	
Urinary free light chain characterisation	Immunology	20mL urine sample (plain sterile universal)	3 days	N/A	Test not routinely available. Please discuss with laboratory and send serum sample for suspected myeloma cases
Urinary free light chain quantitation (24 hour excretion)	Immunology	Immunology	7 days		Available only to Haematologists, not a routine assay

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Urinary Methyl Histamine	Immunology	5mL urine no preservative	21 days	<25µg/ mmol creatinine	Analysed at Northern General Hospital Sheffield.
Urine porphyrins quantitation	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	5 weeks	N/A	Protect sample from light Fresh urine Only for known patients or abnormal screens Interpretation provided Analysed at University Hospitals of Wales
Urine Steroid Profile (Paediatric)	Special Biochemistry	Random Urine in Sterile universal or fluoride bottle	4-6 weeks	N/A	Not available to Primary Care Patient >2days old Collect sample prior to drug therapy Analysed at Kings College Hospital Interpretation provided
V					
Valproate (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Therapeutic range: 50.0 – 100.0 mg/L Telephone Limit: ≥150mg/L	
Vancomycin (monitoring)	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Outpatient/routine GP – 24 hours	Telephone Limit: Pre-dose/trough: ≥20 mg/L	Assay performed on behalf of Microbiology Contact Microbiology for interpretation (See UHL Microguide for guidance: https://viewer.microguide.global/UHL/Abx)

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
VEGF	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	4 weeks	0.01-9.00pg/mL	Analysed at the Institute of Neurology and Neurosurgery, Queens Square, London
Very Long Chain Fatty Acids Peroxisomal Disorders (Paediatric)	Special Biochemistry	1 x 1.2mL Heparin (Paediatric)	4-6 weeks	C22: 15-115 mmol/L C24: 14-80 mmol/L C26: 0.33-1.5 mmol/L C24/C22: 0.44-0.97mmol/L C26/C22: 0.005-0.030 mmol/L	Not available to Primary Care Includes phytanate and pristanate Analysed at Sheffield Children's Hospital.
Vitamin A	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	20 working days	1-6 yr: 0.7-1.40 µmol/L 7-12 yr: 0.91-1.71 µmol/L 13-19 yr: 0.91-2.51 µmol/L Over 19 yr: 1.0.8-3.2 µmol/L	Samples should be separated and frozen at -80° C within 24 hours of collection
Vitamin B1	Special Biochemistry	Ideally 2 x 2.7 mL EDTA (1 x 1.2mL Paediatrics)	20 working days	66.5-200 nmol/L	Protect from light. To be transported on ice and received by laboratory within 60 minutes of collection

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Vitamin B12	Routine Biochemistry (LRI/GH)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	211 – 911 ng/L	Patients with symptoms suggestive of B12 deficiency may benefit from improving their levels to above 350 ng/L. Additional tests are available to evaluate B12 deficiency in patients with levels in the low-normal range (211-350 ng/L). Consult the Duty Biochemist for further tests if there are clinical concerns.
Vitamin B6	Special Biochemistry	Ideally 2 x 2.7 mL EDTA (1 x 1.2mL Paediatrics)	20 working days	35.2-110.1 nmol/L	Protect from light. To be transported on ice and received by laboratory within 60 minutes of collection
Vitamin D	Routine Biochemistry (LRI ONLY)	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	A&E/Inpatients – 3 hours Outpatient/routine GP – 24 hours	Severe deficiency: <15 nmol/L Deficiency: 15 to 25 nmol/L Insufficiency: 25 to 50 nmol/L Adequate: ≥50 nmol/L	25-OH vitamin D analysis
Vitamin E	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	20 working days	0-12 yr: 7-21 µmol/L 13-19 yr: 14-23 µmol/L Over 19 yr: 12-42 µmol/L	Samples should be separated and frozen at -80° C within 24 hours of collection
Vitamin K assay	Special Haematology	3 x 2.7mL EDTA OR 1 x 4.9mL serum	10 days	N/A	Protect sample from light Analysed at St Thomas Hospital, London

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Voltage-gated calcium channel (VGCC) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	28 days	< 45 pM	Analysed by Oxford Radcliffe Hospital..
Voltage-gated potassium channel (VGKC) antibodies	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	<100 pM	Analysed by Oxford Radcliffe Hospital..
von Willebrand Antigen	Special Haematology	2 x 4.3mL citrate	4 weeks	51.9 – 154.3%	Samples must be hand delivered to laboratory within 2 hours of phlebotomy, and before 16:30 NO AIRTUBE SYSTEM Part of von Willebrand Screen H&T clinical approval is required prior to testing
Von Willebrand genetics	Special Haematology	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	6 weeks	N/A	Analysed at QMC, Nottingham Inform laboratory when sending sample Include family tree if available Needs genetics request form
Von Willebrand Multimers	Special Haematology	2 x 4.3mL citrate	1 month	N/A	Analysed at Royal Free Hospital, London
von Willebrand Screen: Factor VIII, Ristocetin Co-factor, von Willebrand Antigen and Collagen Binding Assay if specifically requested)	Special Haematology	4 x 4.3mL citrate	4 weeks	N/A	H&T clinical approval is required prior to testing
Voriconazole (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	5 working days	Prophylaxis and therapy: Pre 1.0-5.5mg/L OR 2.0-5.5mg/L for bulky/disseminated infections	For further interpretation, contact microbiology

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
W					
Warfarin assay	Special Haematology	3 x 2.7mL EDTA	10 days	N/A	Analysed at St Thomas Hospital, London Notify laboratory before collecting sample Avoid collecting on Friday
Weak D versus Partial D	Blood Transfusion (LRI/LGH/GGH)	1 x 7.5mL EDTA 'for blood transfusion	7 days	N/A	Sample sent to Barnsley NHSBT NHSBT form required – see link in Appendix 3
White Cell Count (WBC)	Routine Haematology (LRI/LGH/GH)	1 x 2.7mL EDTA (1 x 1.2mL Paediatrics)	A&E/Priority – 1 hour Inpatients – 3 hours Urgent Primary care – 8 hours Outpatient/routine GP – 24 hours	0-2 yrs: 6.0–17.5 x 10^9/L 2-6 yrs: 6.0–17.0 x 10^9/L 6-12 yrs: 5.0-15.5 x 10^9/L 12-15 yrs: 4.5–13.0 x 10^9/L Adult: 4.0–11.0 x 10^9/L Telephone Limits: During core hours: >30 x 10^9/L Outside core hours: >50 x 10^9/L	Part of Full Blood Count
White Cell Enzymes (Paediatric)	Special Biochemistry	5 x 1.2mL EDTA (Paediatric)	4-6 weeks	N/A	Not available to Primary Care Sample to reach laboratory before 12pm Monday to Thursday Analysed at Willink, Manchester Interpretation provided
X					

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Xanthochromia (CSF)	Special Biochemistry	1 x 2.7mL Fluoride EDTA (1 x 1.2mL Paediatric)	24 hours	All positive results phoned out urgently	Not available to Primary Care MINIMUM volume 70µl required Recommended that sample is not taken until **at least 12 h after and not more than 14 days** relative to timing of suspected haemorrhage. **SAMPLE MUST BE PROTECTED FROM LIGHT** to prevent bilirubin degradation. (Place sample bag in thick brown envelope.) Samples should be delivered to Pathology **as soon as possible** to allow centrifugation **within 1 hour of collection**. Do not use pneumatic air tube. See Section 4 for out-of-hours procedure.
Z					
Zinc	Special Biochemistry	1 x 10 mL serum (no gel separator) (1 x 1.2mL Paediatric) OR 24 hour urine	10 working days (blood) 10 working days (urine)	10-18 µmol/L 4.9-5.8µmol/24hrs	Analysed at Nottingham University Hospitals
ZNT8	Immunology	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	21 days	Negative < 15 U/mL, Positive >/= 15 U/mL	

Test	Laboratory	Sample Requirements	Turn Around Time	Reference Range	Additional Notes
Zonisamide (monitoring)	Special Biochemistry	1 x 4.9mL serum gel (1 x 1.1mL serum gel for paediatrics)	10 working days	10-40 mg/L	Trough level preferable. Analysed at TDM Unit, Epilepsy Centre, Chalfont St Peter.

Please note that reference range provenance is available upon request.