Alder Hey Children's NHS
NHS Foundation Trust

Paediatric Laboratory Medicine (Pathology)

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Haematology and Blood Transfusion Laboratory Handbook 2026

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Haematology and Blood Transfusion

Introduction

Definition: Haematology is the diagnosis, treatment, and prevention of diseases of the blood and bone marrow as well as of the immunologic, haemostatic (blood clotting) and vascular systems. Because of the nature of blood, the science of haematology profoundly affects the understanding of many diseases.

The Haematology Laboratory provides a comprehensive routine testing and specialised assays service for a wide variety of patients. Our biomedical scientists work in close association with the Haematology clinical team, ensuring our analysis and diagnosis is supported by expert clinical advice. We offer a morphology service for blood film and bone marrow referral. We support a number of specialist laboratories and research projects within Pathology offering a blood counting facility for blood, bone marrow, stem cell and fluid samples.

The Haematology laboratory processes approximately 140000 samples per year, acting as a regional diagnostic centre covering the North West, North Wales and The Isle of Man. Our aim is to provide a friendly and accessible routine and emergency service, with minimal test turnaround time together with a full clinical service to which clinicians and their patients have ready access.

The Haematology department is staffed by a team of medical, technical and support staff who provide an interactive clinical and analytical service. The majority of the staff are members of professional associations which have an important role in the setting of professional standards and standards of analytical performance. Continuing Medical Education and Continuing Professional Development is supported by membership of professional bodies and learned societies including the Royal College of Pathologists and the Institute of Biomedical Science which assist staff in maintaining an up-to-date clinical knowledge for the department. All qualified members of laboratory staff are registered with the Health Care Professions Council.

The clinical service is led by 3 Consultant Haematologists and includes the Regional Leukaemia and Oncology Unit, the Regional Paediatric Haemophilia Comprehensive Care Centre, Specialist Haemoglobinopathy Trust and General Haematology. The department undertakes all aspects of paediatric haematology and acts as a regional referral centre for haemophilia, red cell disorders, leukaemia and oncology. The department also provides analytical and clinical support to the regional Neonatal Intensive Care Unit located at the Liverpool Women's Hospital.

Routine Haematology Section

This section provides approximately 66,000 full blood counts per year including visual white cell differential counts, ESR, Glandular fever screening tests, G6PD, sickle and malaria screens. The section also assists in the collection, preparation and staining of bone marrow samples.

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Our aim here is to provide: A timely and accurate service.

Diagnosis of anaemias and other cytopenias.
The diagnosis of primary haematological disorders.
Some help for the clinician in highlighting where significant non-haematological disease is present and manifest in either an abnormal blood count or ESR.
Monitoring of treatment particularly in areas where the blood count may be affected, such as chemotherapy.
Biomedical scientists regularly review blood films as an aid to diagnosis of disease, including leukaemia, sepsis, anaemia and malaria.

Coagulation Section

Approximately 12000 coagulation screens and 1500 specific clotting factor assays are performed annually.
Capillary blood sampling is associated with activation of many clotting proteins therefore specimens for coagulation screens and specific factor assays **MUST** be collected by venous sampling.

The following services are provided:

Routine Coagulation screens as part of pre and post-op assessment, and investigation of patients suspected of having an increased tendency to bruise or bleed. Monitoring warfarin treatment using the INR (Near Patient testing is available in the Trust, please discuss this with the cardiac nurse specialists).

Monitoring Heparin therapy using the anti-Xa Heparin assay for patients receiving Low Molecular Weight Heparin (LMWH) and Unfractionated Heparin (UFH).
The diagnosis and management of congenital or acquired bleeding disorders; the former includes haemophilia, the latter the bleeding problems in the critically ill.
Platelet function tests including platelet aggregometry are available following discussion with the Consultant Haematologist and Senior BMS in Coagulation.
Thrombophilia screen, including the lupus anticoagulant, anti-thrombin, protein S, protein C, resistance to activated protein C, anti-cardiolipin antibody, factor V Leiden and Prothrombin mutations are referred to a local referral laboratory for analysis. Careful interpretation of results for these tests by a consultant haematologist is required if the patient is receiving Heparin or Warfarin therapy.

Other than in the acute situation (i.e. prior to commencement of heparin) the Consultant Haematologist must be contacted prior to requesting Thrombophilia screens to ensure that the correct investigations are carried out.

Transfusion Section

Approximately 9500 blood groups are performed annually, with over 4000 crossmatches of red blood cells.

This section offers the following services:

Routine blood grouping and antibody screen with identification of antibodies. Any atypical antibodies or anomalous blood groups, phenotypes and genotypes will require samples to be referred to the NHS Blood and Transplant service (NHSBT) for confirmation. This will add to the turnaround of results and often require an additional sample.
Provision of compatible Red Blood Cells (RBC), for routine and emergency cases, for surgery, bleeding patients and some cases of anaemia.
Provision of compatible blood products including Platelets, Fresh Frozen Plasma and Cryoprecipitate as required for the appropriate treatment of bleeding disorders, congenital or acquired. The laboratory holds a stock of standard blood products. If there are "special requirements" for blood products including fresh RBCs and irradiated products additional time should be given when ordering the products to allow the laboratory to source the products from the NNHSBT.

N.B. Always inform the laboratory of Urgent or Emergency crossmatch and blood product requests by telephoning from outside the hospital 0151-228-4811, then option 1, followed by extension 4989, option 3. Internally, dial 4989, option 3.

Direct and indirect antiglobulin test.
Kleihauer test to guide appropriate administration of anti-D during or following pregnancy to both general practice and hospital depts.
The investigation of cold agglutinins, confirmation of blood grouping anomalies, FMH quantitation, antibody identification and the investigation of incompatible crossmatching are referred to NHSBT, Speke.

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Special Haematology Section

The regional leukaemia and oncology unit is supported with a rapid diagnostic service comprising of immunophenotyping of white blood cell surface and intracellular markers in the investigation and diagnosis of leukaemia. In addition, the Infectious Diseases and Immunity division benefits from T&B lymphocyte subset testing on-site for immune disorders.

This section offers the following services:

Provision of the Regional Neonatal Sickle Cell Screening service and haemoglobin fraction quantitation by HPLC, If a haemoglobinopathy is diagnosed, follow up clinical support is provided by the Consultant Haematologist and clinical team.

CD34 enumeration for stem cell harvests.

Screening for Hereditary Spherocytosis by 5-EMA flow cytometry.

Rheumatoid Factors by latex agglutination.

These special assays are to be discussed with laboratory staff before samples are sent.

Opening Hours

A laboratory service is provided 24 hours per day, seven days per week. The service is however, divided into periods where the full repertoire of tests is available (normal working hours service), and periods where a restricted range of tests are available.

Normal working hours are Monday to Friday, 9.00 am to 5.30 pm (with the exception of public holidays), a team of Biomedical Scientists and assistants are available to handle the main workflow for the laboratory.

Outside normal working hours (All day Saturday, Sunday and Bank Holidays, and all night duties – 17:30 – 09:00hrs). A single Biomedical Scientist provides the combined Haematology and Blood Transfusion service, as a result a restricted service is available. Requests should be limited to those where there is a reasonable likelihood that the results of the laboratory investigations will affect the immediate management of the patient, or where regular monitoring is required for unstable patients. Delays in service provision during this time are likely and are dependent on current workload.

"Urgent request for blood products" will be prioritised.

Where to find us

The Haematology department is situated on the First Floor of the clinical support block of the new hospital building; staff can access the laboratory from the first floor of the main hospital crossing the bridge at the tree house end of the building.

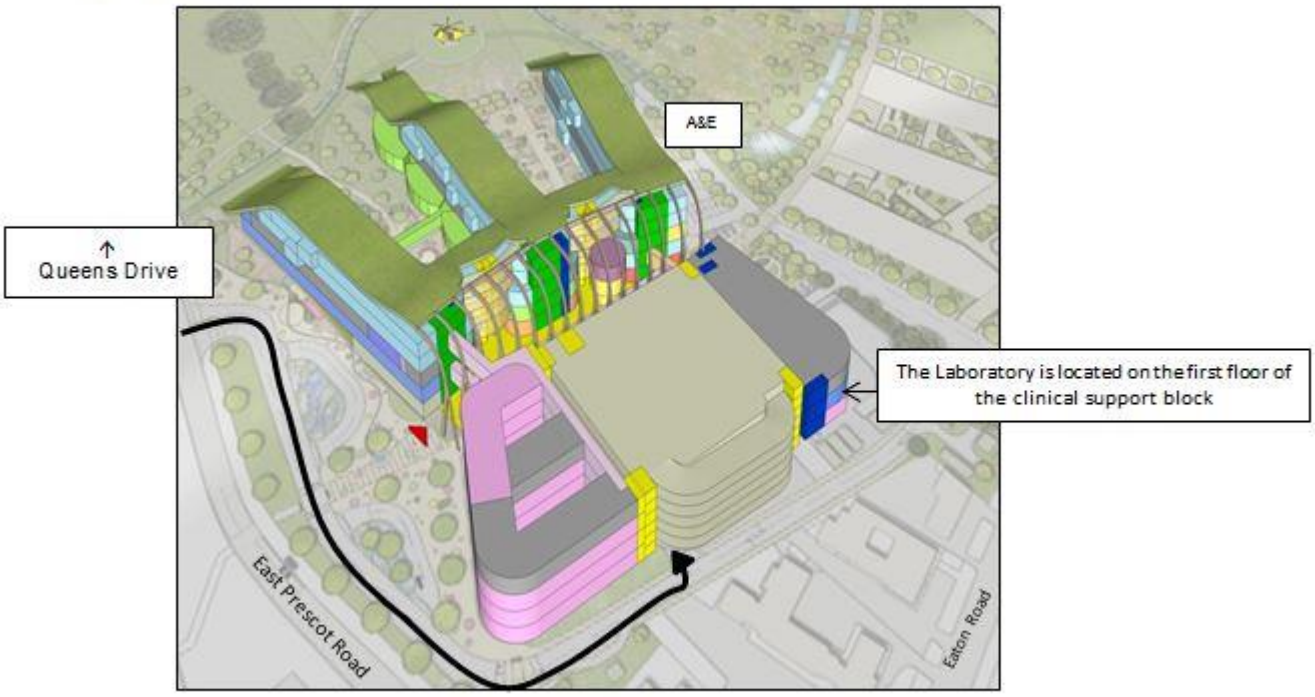
Visitors to the laboratory should phone in advance to arrange a meeting point.

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Where to find us:



The entrance to the multi-story visitor car park is located off East Prescot Road.

Making requests

All URGENT requests should be preceded by a telephone call. If this relates to haematology or coagulation tests, then from outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option **2**. Internally, dial 4989, then option **2**. If it relates to the urgent provision of blood products, then from outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option **3**. Internally, dial 4989, then option **3**. The laboratory will prioritise all URGENT requests.

URGENT requests for Blood Products for bleeding patients will be given priority over all other work.

The laboratory is unable to provide the status of samples waiting to be processed or in process and users are directed to Meditech for this information. The same applies to the provision of blood products and user are directed to the TAR module in Meditech to obtain this information.

Where necessary for patient care, the laboratory shall communicate with users or their representatives, to clarify the users request.

Requests for services from Alder Hey Hospital and clinics, and Neonatal Intensive Care Unit at Liverpool Women's Hospital should be made using the Trust's Meditech System (paper request forms are available during times when Meditech is not available).

Requests from GP surgeries should be printed, handwritten using the specific Alder Hey Pathology request forms or ICE forms, ensuring that details entered on the request form are legible. Staff will ring/email etc when a test request needs clarification.

Verbal requests will not be accepted. All tests must be requested on Meditech and the printed request form sent to Specimen Reception. If the request form cannot be printed, then fill out the reverse of the sample collection card attached to the sample transport bag or a Meditech Downtime form can be completed.

Request forms must contain as a minimum:
- Patient's name

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- NHS Number or Address
- Hospital Unit number (case sheet number) where available
- Date of birth
- Ward/Clinic
- Date of sample
- Type of sample
- Consultant /GP name / contact details of requesting doctor
- Investigations required
- Products requested (for blood transfusion
- Date and time required (for blood transfusion)
- Clinical details
- Special product requirements e.g. CMV negative
- Urgency of request

It is also desirable that the request form provides the following information:
- Patients Gender
- Sample type
- Signature of person taking sample
- Gestational age (inn premature babies)

Clinical information and the patient's date of birth are particularly important in paediatric requesting, so that the laboratory staff may understand the reason for the request and consider the need for further investigation an interpret the results against an appropriate age specific reference range.

The laboratory may carry out necessary procedures provided they are in the best interest of the patient.

Requesting additional investigations:

Freshly collected samples are preferred for analysis. The availability to add further tests to a sample will depend on the sample type, volume of sample available and stability of the analyte requested.

Electronic process for add on tests

If additional test(s) are required after a sample has been sent to the laboratory, these can be ordered directly from within the Meditech test catalogue by searching for and selecting the '**Haematology add-on'** test. This process involves completing a brief form to capture the details of the required extra test(s) and the original specimen. No additional specimen labels are required. The lab will electronically receive the 'add-on' request, action it, and issue a 'result' that indicates if the request was successfully completed, or a reason if not such as 'specimen insufficient'.

When requesting add-ons for Anti-Xa assays, it MUST be stated whether it is for the UFH or LMWH assay.

A simple pdf ward guide outlining the new procedure can be found on the **trust DMS document site** in the 'Medicine->Lab Medicine' subsection, in addition to the Lab iPassport document system (Ref: Blood Sciences 2213).

For service users unable to access the Alder Hey Meditech system, additional tests can be requested by contacting the laboratory

If the haematology or coagulation add-on request is urgent, contact the laboratory from outside the hospital on 0151-228-4811, then option 1, followed by extension 4989, option 2. Internally, dial 4989, then option 2. If it relates to the urgent provision of blood products, then from outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option 3. Internally, dial 4989, then option 3.

Sample Collection:

Samples should be collected in accordance with the **Trust Policy for Capillary Blood Collection C30 (Link to C30 on the Trust DMS website** except those for blood coagulation, which must be **venous or arterial**.

Consent:

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It is the responsibility of the requesting clinician to obtain consent for the collection of specimens (see **Alder Hey Informed Consent Policy** - **C7** on Trust DMS website). For certain tests e.g. genetic testing, written consent may be required in addition to the request form.

Any special procedures such as the collection of bone marrow in theatre, requires documentation of written consent in the patient notes.

Electronic consent is now required for blood transfusions, but not the responsibility of the laboratory to police this.

Labelling samples.

SPECIAL REQUIREMENTS FOR *ALL* SPECIMENS SENT TO THE BLOOD TRANSFUSION LABORATORY.

The transfusion laboratory operates a zero tolerance policy and will therefore ***NOT*** accept incorrectly labelled blood samples and forms.

Patient details for ***ALL*** samples for Blood Transfusion ***MUST*** be handwritten and must include;

I. Patient's full name

II. Hospital number or NHS Number.

III. Date of birth

IV. Ward/Clinic

V. Date of sample

VI. Signature of person taking sample

REQUEST/SAMPLE IDENTIFICATION

Any mistakes or omissions in the labelling of samples and request cards can lead to deleterious effects on the patient. In order to avoid any such possibility, users of the laboratory are urged to comply with the following safety check procedures.

1. Positive patient identification must be made either by direct questioning, reference to a patient's hospital identity bracelet or, for unconscious patients, the use of a unique numbering system.

2. Requests for group and/or crossmatch must be in a special blood transfusion tube which is then clearly labelled by hand with all available patient identification, the minimum acceptable Patient Identification Details (PID) on the specimen tube is **Full Name, Date of Birth and Hospital number** (or NHS Number or Address), **Location of patient, Date of sample and signature of the person taking the sample**.

PRE-PRINTED IDENTIFICATION LABELS WILL NOT BE ACCEPTED.

Sample tubes must not be labelled in advance.

3. The accompanying request MUST BE completed on Meditech by a doctor or trained Nurse Practitioner.

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4. Clear instructions as to when, where and why blood grouping or cross-matching is being requested must be included in the spaces indicated on the request form.

NB - Incorrectly or incompletely labelled samples/request forms will not be accepted by the Transfusion Laboratory and will be discarded.

FULL IDENTIFICATION IS ABSOLUTELY NECESSARY.

TIMING OF SAMPLES FOR PRE-TRANSFUSION TESTING

Transfusion or pregnancy may stimulate the production of unexpected antibodies against red cell antigens through either a primary or secondary immune response. The timing of samples selected for crossmatching or antibody screening should take account of this, as it is not possible to predict when or whether such antibodies will appear. It is also important to note that all cellular blood components contain residual red cells and may elicit an immune response.

To ensure that the specimen used for compatibility testing is representative of a patient's current immune status, serological studies (Antibody Screen and Crossmatching) should be performed using blood collected no more than 3 days in advance of the actual transfusion when the patient has been transfused or pregnant within the preceding 3 months, or when such information is uncertain or unavailable. The 3 days includes the de-reservation period, e.g. if the sample was 1-day old, the blood would have to be transfused within 2 days.

Where there has been no transfusion or pregnancy within the preceding 3 months, the sample is valid for up to 7 days.

Delivery of samples to the Transfusion laboratory

i. For elective transfusions the same afternoon, the laboratory must receive the sample by 10am

ii. For elective transfusions the following morning or later, the sample must be received by the laboratory by 3.30 pm

iii. Samples arriving after the designated times may be delayed to the next day.

During the routine working day (Monday to Friday 09.00-17.30) a team of Consultants, Scientists and assistants are available to provide a full repertoire of tests. During the "OUT OF HOURS" service, requests should be limited to those where there is a reasonable likelihood that the results of laboratory investigations will affect the immediate management of the patient, or where regular monitoring is required for unstable patients. Delays in service provision during this time are likely to be dependent on current workload – PLEASE BE PATIENT!

1. Full Group and Antibody Screen Requests Samples are ABO and Rhesus (D) grouped and screened for atypical antibodies. Samples should be sent to the laboratory for analysis as early as possible to allow for testing during the routine working day. Confirmatory blood grouping samples need to be taken **30 minutes** apart.

2. Requests for ADULT RBC or PAED RBC will have ABO and Rhesus (D) compatible donor units selected and cross-matched for named patients and held for that patient until 9.00 am on the day after the date

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for which the request was made. If your patient has been transfused, a fresh sample for further crossmatching will be required after 3 days. Please give as much time as possible for the lab to complete grouping, antibody screening and/or crossmatching, in case atypical antibodies are encountered which could cause a delay in the provision of compatible products. The hospital operates a Maximum Surgical Blood Ordering Schedule. Under normal circumstances, the Transfusion Laboratory will crossmatch according to the MSBOS, unless clear reasons for doing otherwise are provided by the requesting clinician. For further details, please contact the laboratory.

3. Accident and Emergency samples taken during a major incident: An A/E or MAJAX number is only acceptable for identification purposes on requests for crossmatching of blood for IMMEDIATE transfusion, not for group and save samples.

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Requirements for all other areas of the laboratory printed patient identification labels for samples are acceptable and ***MUST*** include the requirements listed below as a minimum.

a. Sample must have

Patient's full name
Hospital number or NHS Number.
Date of birth
Ward/Clinic
Date of sample
Signature of person taking sample

All samples must be accompanied by a relevant request form that includes

Patient's name
NHS Number or Address
Hospital Unit number (case sheet number) where available
Date of birth
Ward/Clinic
Date of sample
Type of sample
Consultant /GP name / contact details of requesting doctor
Investigations required
Products requested (for blood transfusion)
Date and time required (for blood transfusion)
Clinical details
Special product requirements e.g. CMV negative
Urgency of request

It is also desirable that the request form provides the following information.

Patients Gender
Sample type
Signature of person taking sample
Gestational age (in premature babies)

Clinical information and the patient's date of birth are particularly important in paediatric requesting, so that the laboratory staff may:

Understand the reason for the request and consider the need for further investigation.
Interpret the results against an appropriate age specific reference range.

Samples not meeting these minimum criteria may be rejected.

The Department reserves the right to decline to analyse samples;
If the sample is unlabelled, missing identification, clotted or insufficient or have leaked in transit.

If a suitable request for or electronic request form (Meditech), indicating what investigations are required and why, is not received with the sample.
If the sample or request are contaminated with blood or bodily fluids.
Have taken too long to reach the laboratory from the time the sample was collected.
Samples falling into these categories will be rejected and the reason for rejection included in the report the user will be notified. This will appear under a speech bubble in Meditech.

Transport of samples:

Timing

Unless a specific sample timing is stated for a particular test in the test repertoire, samples should be transported to the laboratory as soon as possible after collection. All samples should arrive within a maximum of 4 hours from the time collected to ensure the stability of the sample and analytes to be tested. If samples are received more than 4 hours after collection and this delay can affect the validity of results appropriate comments will be appended to the report to describe the possible affect.
Sadly, coagulation samples will have to be rejected if received more than 4 hours after collection.

Temperature

Unless a specific transport temperature is stated for a particular test in the test repertoire and sample requirements (see below) *all* samples should be transported to the laboratory at room temperature.
In the event of extremes of weather affecting the internal hospital temperature every effort should be made to transport the specimen as quickly as possible to protect the specimen integrity.
Please contact the laboratory for information on appropriate sample storage if samples are to be stored prior to transport to the laboratory. An audit is completed twice a year to ensure temperatures of samples being transported do not breach 8-25^{0}C in winter or summer months

Within the hospital

Samples collected within the hospital should be transported to the laboratory as per Trust policy (RM50 – Labelling, packaging handling and delivery of laboratory specimens policy), via the air tube system or delivered to the laboratory reception by hand. Samples transported on foot should be transported in an opaque red specimen transport box.

Samples transported from external sites:

Routine diagnostic samples should be transported in sealed specimen containers, covered with absorbent material in sufficient quantity to absorb the contents of the container(s), and placed inside a plastic specimen bag which in turn is placed inside rigid, opaque packaging in line with UN3373 regulations. When multiple sample containers are placed in single secondary packaging, they should either be individually wrapped in absorbent material or separated to prevent contact between them. Sample packages should be labelled with the UN3373 symbol. The package should also be labelled with the words "Diagnostic Specimen" and the name and address of the referring laboratory.

Category 3 infectious substances

Please note that Category 3 infectious substances are assigned to UN 2814 regulations and must be packaged in accordance with UN Packaging Instructions PI620 (road/ rail) or PI602 (air). Further information is available via the Health and Safety Executive website.
Where specimens are transported frozen on dry ice, the dry ice must be placed outside the plastic specimen bag and packages clearly identified with a dry ice identification symbol:
If samples are transported in wet ice, the ice must be placed outside the plastic specimen bag and the packaging must be leak-proof.
Please also enclose a completed request form including:
Full name of patient
Date of Birth
Hospital Number or NHS number or address
Name and location of requesting clinician
Tests requested
Clinical details including details of any medication.

If the integrity of a sample has been compromised and this results in a health risk, then the organisation responsible for transporting the sample will be informed and actions taken to reduce the risk and prevent reoccurrence.

Protection of Personal Data and Information

Personal data and information on request forms is required in order for the laboratory to operate and may be stored on laboratory computer files. The intent of the laboratories is to ensure that any personal data and information is treated lawfully and in accordance with the NHS requirements concerning confidentiality and information security standards. To this end we fully endorse and adhere to the Trust Data Protection Policy, the requirements of which

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are primarily based upon the Data Protection Act 1998 which is the key piece of legislation covering security and confidentiality of personal information.

All personal information is protected in line with the Trust Confidentiality Policy (RM37).

Key contacts

Haematology Medical Staff		Internal extension	Direct Dial
Consultant Haematologist (Head of Department)	Dr Kat Lindsay	Secretary Ext 3680	Via switchboard
Consultant Haematologist	Dr Jessica Sandham	Secretary Ext 3680	Via switchboard
Consultant Haematologist	Dr Rekha Thangavelu	Secretary Ext 3680	Via switchboard
Consultant Haematologist	Vacant		
Haematology Biomedical Scientists (BMS)			
Lead BMS Haematology & Blood Transfusion	Mr Andrew Simpson	Ext 2229	0151 252 5229
Senior BMS Coagulation	Mrs Clare Taylor	Ext 4989	0151 228 4811
Senior BMS Routine Haematology	Mrs Lisa McAllister	Ext 4989	0151 228 4811
Senior BMS Special Haematology	Ms Ashley Cain	Ext 4989	0151 228 4811
Senior BMS Transfusion	Mr Andrew Acheampong	Ext 4989	0151 228 4811
Transfusion Practitioner	Mrs Tracey Shackleton	Ext 2006	0151 252 5006

Clinical Advice

Clinical advice on the planning and interpretation of haematological investigations is available at all times. The Consultant Haematologist on call can be contacted for clinical advice and result interpretation via the hospital switchboard (0151 228 4811).

Results and Reports

The results of most routine FBC and Clotting Screens will be available on Meditech within 4 hours.

We aim to provide results for **URGENT** Blood Counts and Clotting Screens within 1 hour of receiving the sample. Significantly abnormal results that require clinical action are telephoned to the requesting clinician. This is dependent on workload.

All incoming work is classified as routine unless the requesting clinician contacts a member of laboratory staff to inform them that the specimen requires urgent analysis and provides a valid reason.

Typical turnaround times are dependent on the complexity of the requested test, current workload and staff availability. Some tests are referred to external laboratories, and the turnaround time for such tests is largely out of our control.

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Additional time has to be allowed for appropriate transport of specimens, especially if between hospitals.

Reference Ranges

It is important to understand that reference ranges are age (and in some instances gender) related and appertain to particular methodology. The reference ranges quoted in these pages and with printed and electronic results therefore are only applicable to analyses performed at the Haematology Department of Alder Hey Children's NHS Foundation Trust. Reference ranges are displayed with all results on both computer screen and printed reports. For further clinical interpretation of laboratory results please contact the duty Consultant Haematologist.

Quality

The quality of results is controlled by internal quality control procedures and monitored by participating in external quality assessments, sample sharing and peer review. The Haematology department participates in external quality assurance and proficiency schemes from UKNEQAS.

With every result produced, there is an associated uncertainty, which may be attributed to a number of small variations arising at any stage of the analytical process. Uncertainty of Measurement (UoM) is calculated for each test reported at Alder Hey Children's Hospital and included in the relevant operating procedures.

For more information on UoM, please contact a Consultant Haematologist or Lead BMS for Haematology & Blood Transfusion.

Common interferences

Users should be aware that samples collected by capillary puncture from children are more prone to interference than samples collected by venepuncture in adults. Samples collected by capillary puncture from children are more prone to contamination with Vaseline / grease if used to collect samples this can affect the results of many tests and may in certain circumstances block and or damage analyser function. Therefore, Vaseline or grease should not be used.

The most common interferences are haemolysis, lipaemia and jaundice. All our samples are routinely checked for the common interferences and the affected tests are indicated on the final report. Heparin and other contaminating fluids from venous line samples will interfere with coagulation test results (especially APTT, TT and Factor assays)

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and many other analytes.

Delays of more than a few hours in sample transport to the laboratory can also result in erroneous results for some analytes, e.g. PT, APTT. Laboratory users are encouraged to send samples to the laboratory as quickly as possible to minimise the effects of storage on the results produced and to help streamline workflow through the department.

Test repertoire and sample requirements.

The main sample tubes used in Haematology are shown below. Printed ward ordered or BMV labels (excluding blood transfusion) from Meditech should also define the sample type and volume required. It is not always necessary to take multiple samples because multiple labels have printed. For example. FBC and retics can be performed on a 0.8 ml EDTA (pink top) sample. Only one label is required on the sample tube. Discuss with experienced staff on the ward before collecting. If spare blood is collected, this will be happily received in the laboratory.

The order of fill for capillary / micro sample collection is different from that of venepuncture using evacuated tube systems. If multiple samples are to be collected the EDTA (pink top) specimen should be collected first followed by Lithium heparin (orange top), followed by plain (no anticoagulant) tubes, and finally fluoride/ oxalate (yellow top). However, if a Blood Gas must be collected at the same time this should be collected first to ensure the results.

ALWAYS PUT THE CORRECT CAP ON EACH TUBE AND DO NOT DECANT FROM ONE TUBE TO ANOTHER AS THIS WILL LEAD TO CONTAMINATION WITH THE WRONG ANTICOAGULANT WHICH WILL RENDER THE TESTS AS NON-REPORTABLE.

Seeking Advice

Enquiring about sample types and amounts

This handbook covers all tests currently undertaken or referred by the department and as such, will describe the sample type and expected volume. Contacting the laboratory by phone should be limited to urgent requests only.

The sample volumes indicated are to maximise testing and to optimise the quality of the sample if *in vitro* anticoagulant is present. If inadequate sample volumes are provided, it may be necessary to 'TNP- Test Not Performed' those tests from the profile. If there are clinical reasons for giving preference to specific tests i.e. FBC over ESR, please indicate this clearly on the request or Meditech

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Haematology, Coagulation and Immunology Test Requirements:

Test name (Meditech Order)	Specimen type	SAMPLE REQUIRED /TUBE LID COLOUR	SPECIAL REQUIREMENTS
ADAMTS 13 Assay inc. Inhibitor (ADAMTS 13)	Venous/ arterial blood only	2 x 1.3ML Citrate (Green)	Capillary samples are not permitted Referred to LCL. Daily courier used.
Adrenal Gland Antibodies (ADABS)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti Cardiac Muscle Ab (CARD MUSC AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL. Daily courier used.
Anti-Cardiolipin Assay (ACA) inc. Anti Beta 2 Glycoprotein 1 Ab	Venous/ arterial blood only	2 x 1.3ML Citrate (Green)	Capillary samples are not permitted Referred to LCL on ice Tues & Thurs
Anti-Centromere Ab (CENTROMERE AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL. Daily courier used.
Anti-double stranded DNA (ANTI dsDNA)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-double stranded DNA titre (DSDNATITRE)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Enterocyte Ab (ANTI ENTEROCYTE)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Extractable Nuclear Ag (ENA SCREEN)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Gastric Parietal Cell Ab (Gastric PC AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Glomerular Membrane Ab (ANTI GBM AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti Mitochondrial Ab (AMA ab)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti Myositis Ab (ANTI MYOSITIS)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to Uni of Bath. **NOT LCL** Next day special delivery post
Anti-Neutrophil Cytoplasmic Ab (ANCA)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-nuclear antibodies (ANA)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Skin Ab (ANTI SKIN AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Smooth muscle Ab (SMA Ab)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Anti-Striated Muscle Ab (STRIATED MUSCLE)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	Referred to LCL, daily courier used
Antithrombin Activity (ATIII ACT)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted Refer to Thrombophilia screen unless for ECMO daily bloods
Anti Xa LMWHeparin (ANTI XA) Anti Xa Unfractionated Heparin (ANTI XA UFH) Anti Xa (ECMO Pts) (ANTI XA ECMO) Anti Xa (RDU Only) (ANTI XA RENAL)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted Test specific reference ranges- choose with care
APTT (APTT) including APTT Ratio	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted
APTT 50:50 Mix (APTT 50:50 MIX)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted

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Aspirated Fluid Cytology (FLUID CYTOLOGY)	Pleural, synovial, ascitic, bronchoalveolar lavage fluid	0.5ml (20 ml Universal clear container)		Check not for Microbiology
Auto Antibody Screen (AUTO AB SCREEN)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
BCR ABL (BCR ABL)	Capillary or venous blood	4.0 ML EDTA (Purple)		Discuss with Haem Consultant Referred to HODS, LCL. Requires courier and HODS episode ID
Blood film (FBC)	Capillary or venous blood	0.8ml EDTA (Pink)		Free text when ordering FBC in Meditech and reason for film
Bone Marrow Aspirate (BMASP)	Bone marrow	By special request- 1 ml EDTA (Lilac)	4 ML EDTA (Purple)	Discuss with Haem Consultant
Blood / Marrow cell markers (CELL MARKERS)	Blood / bone marrow	By special request- 1 ml EDTA (Lilac)	4 ML EDTA (Purple)	For leukaemia diagnosis. Discuss with Haem Consultant
BMT HLA Typing (HLABMT)	Capillary or venous blood	4.0 ML EDTA (Purple)		Referred to Manchester, requires courier and additional request form. STORE AT RT
BMT HLA SPECIFIC ANTIBODY SCREENING (HLABMT)	Capillary or venous blood	5 ML PLAIN TUBE (White)		Referred to Manchester, requires courier and additional request form STORE IN FRIDGE 4ºC
CAR-T Persistence (CAR-T)	Capillary or venous blood	4.0 ML EDTA (Purple)		Discuss with Haem Consultant; referred to GOSH; **prior arrange with lab**
cBRAF v600E	Venous blood	10 ML Cell-Free DNA BCT		Preserves DNA. Sent to Newcastle for Oncology patients only
C1 Esterase profile (C1EST)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
C1 Esterase Inhibitor Function (C1ESTFUNC)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
CD34 Profile (CD34)	Capillary or venous blood	0.8 ml EDTA (Pink)		Discuss with Haem Consultant and BMT CNS; **prior arrange with lab**
CF Gene Analysis (CFGENE)	Capillary or venous blood	4.0 ML EDTA (Purple)		Requires Genomic 'R' Code Referred to LWH, daily courier used
CF Gene Buccal Swab (CFGENEBUCCAL)	Buccal Swab	Buccal Swab		Requires Genomic 'R' Code Referred to LWH, daily courier used
Clotting screen (CS)	Venous/ arterial blood only	1.3 ml in Citrate (Green)		Capillary samples are not permitted
COAGULATION MOLECULAR GENETICS FII, FV, FVII, FVIII, FIX, FX, FXI, FXII, VWF.	Capillary or venous blood	4.0 ML EDTA (Purple)		Discuss with Haem Consultant Requires Genomic 'R' Code Referred to LWH, daily courier used
Constitutional DNA Storage (CDNA)	Capillary or venous blood	4.0 ML EDTA (Purple)		Requires Genomic 'R' Code Referred to LWH, daily courier used
CSF Cytology (CSF CYTOLOGY)	CSF	0.5ml (20 ml Universal clear container)		CSF cytology for leukaemia diagnosis. Discuss with Haem Consultant
Cytogenetics (Karyotype / Microarray	Capillary or venous blood	1 ml EDTA neonate (Lilac)	4 ML EDTA (Purple)	Requires Genomic 'R' Code Referred to LWH, daily courier used
	Capillary or venous blood	1 ml Heparin neonate (Orange)	4 ml Heparin (Orange)	Heparin for the karyotype but if abnormal need Microarray (EDTA), so send together
Direct antiglobulin test (DAT)	Capillary or venous blood	0.8 ml EDTA (Pink)		Refer to blood transfusion if a blood group is required
D-Dimer (D-Dimer)	Venous/ arterial blood only	1.3 ml Citrate (Green)		Capillary samples are not permitted
Differential WBC (FBC)	Capillary or venous blood	0.8 ml EDTA (Pink)		Included in FBC unless WBC ~ 0.0
Hemlibra Assay (HEM)	Venous Blood	3 x 1.3ml Citrate (Green)		Capillary samples are not permitted Emicizumab level, Bovine and Human FVIII and inhibitor

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Erythrocyte Sedimentation Rate (ESR)	Capillary or venous blood	0.8 ml EDTA (Pink)	Can use FBC sample if enough. Not processed out of hours.
Factor VIIIc, IXc, XI, XII, XIII, II, V, VII, X assays (FACTOR VIII, IX etc)	Venous blood only	3 x 1.3 ml Citrate (Green)	Capillary samples are not permitted
Factor VIII binding assay (FVIII BINDING)	Venous blood only	3 x 1.3 ml Citrate (Green)	Capillary samples are not permitted Discuss with Haem Consultant Referred to Sheffield, requires courier; **prior arrange with lab**
Factor VIII Inhibitor assay (FACTOR VIII INH) Factor IX inhibitor (FACTOR IX INH) Factor VIII inhib (Nijmegen) (FACTOR VIII NIJ)	Venous blood only	3 x 1.3 ml in Citrate (Green)	Capillary samples are not permitted Discuss with Haem Consultant
Fibrinogen (Clauss) (FIBC)	Venous blood only	1.3 ml Citrate (Green)	Capillary samples are not permitted
FOXP3 (TBEXTENDED) Part of T and B Extended Subset	Capillary or venous blood	0.5 ml EDTA (Pink)	Referred to Newcastle, Requires courier; **prior arrange with lab**
Fragile X (Fragile X)	Capillary or venous blood	1 ml EDTA neonate (Lilac) / 4 ML EDTA (Purple)	Requires Genomic 'R' Code Referred to LWH, daily courier used
	Capillary or venous blood	1 ml Heparin neonate (Orange) / 4 ml Heparin (Orange)	Paired with EDTA
Full Blood Count. (FBC)	Capillary or venous blood	0.5 ml EDTA (Pink)	Mix and fill to the line for best results
Factor V Leiden (FVL)	Capillary or venous blood	0.5 ml EDTA (Pink)	Part of Thrombophilia screen Referred to LCL, daily courier used
G6PD screen (G6PD screen)	Capillary or venous blood	0.5 ml EDTA (Pink)	FBC and retics required, use same sample. **Don't use for females**. Order G6PD assay
G6PD assay (G6PD)	Capillary or venous blood	0.5 ml EDTA (Pink)	FBC and retics required, referred to Manchester. London if PK required; **prior arrange with lab**
Glandular Fever Screen (GFST)	Capillary or venous blood	0.5 ml EDTA (Pink)	Pair with FBC and blood film
Haematology Add-On Request (ADDONH)	Depends on nature of request	Depends on nature of request	Accepted or rejected based on sample volume and validity of primary sample. If for blood film, state reason
Haemoglobinopathy screen (HB ELECTRO)	Capillary or venous blood	0.5 ml EDTA (Pink)	Must request FBC also Performed by HPLC
Helper/suppressor lymphocytes (T4T8)	Capillary or venous blood	0.5 ml EDTA (Pink)	Must request FBC also
Hermansky-Pudlak Syndrome (HPS)	Venous blood only	4.0 ML EDTA (Purple)	Discuss with Haem Consultant, **prior arrange with lab**
HIT screen (HIT)	Venous/ arterial blood only	2 x 1.3 ml Citrate (Green)	Referred to LCL, daily courier used
HLA B27 (HLA B27)	Capillary or venous blood	4.0 ML EDTA (Purple)	Referred to LCL, daily courier used Keep at room temperature
HLA B51 (HLA B51)	Capillary or venous blood	4.0 ML EDTA (Purple)	Referred to LCL, daily courier used Keep at room temperature
HLA class 1 (A,B,C) type (HLACLASS1)	Capillary or venous blood	4.0 ML EDTA (Purple)	Referred to LCL, daily courier used Keep at room temperature
HLA Class II (DQ,DR) type (HLACLASSII)	Capillary or venous blood	4.0 ML EDTA (Purple)	Referred to LCL, daily courier used Keep at room temperature.
HLA DQ2 and HLA DQ8 (HLADQ2:HLADQ8)	Capillary or venous blood	4.0 ML EDTA (Purple)	Referred to LCL, daily courier used Keep at room temperature

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HMWK & Kallikrein	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Discuss with Haem Consultant, referred to St Thomas, London; **prior arrange with lab**
HODS TESTING (HODS)	Blood, bone marrow or CSF	4.0 ML EDTA (Purple)	0.5ml (20 ml Universal clear container)	Discuss with Haem Consultant. Referred to HODS, LCL.; requires courier and HODS episode ID
Intrinsic Factor Ab (INTRINSIC FACAB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
Investigate Long APTT (LONG APTT)	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Capillary samples are not permitted FVIII, FIX, FXI, FXII assays
Investigate Long PT (LONG PT)	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Capillary samples are not permitted FII, FV, FVII, FVII assays
JAK2 (HODS)	Capillary or venous blood	4.0 ML EDTA (Purple)		Discuss with Haem Consultant. Requires courier and HODS episode ID
Liver Auto Antibodies (LAA)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
Liver/ Kidney Microsomal Ab (LKM AB)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)		Referred to LCL, daily courier used
Lupus Anticoagulant Screen (LUPUS)	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Capillary samples are not permitted Referred to LCL on ice Tues & Thurs
Lymphocyte function assay (LYMPHFUNC)	Capillary or venous blood	5 ml whole blood **in preservative free heparin from lab** + 5 ml normal control (healthy volunteer) as above		Discuss with Haem Consultant; referred to Newcastle; **prior arrange with lab**
Malaria parasites Screen (MALARIA SCREEN)	Capillary or venous blood	0.5 ml EDTA (Pink)		FBC, retics and blood film required Travel history essential
Malarial Parasites – Confirm (MALI)	Capillary or venous blood	0.5 ml EDTA (Pink)		Added to all malaria screen results are confirmed by LSTM
Methaemoglobin reductase	Capillary or venous blood	0.5 ml EDTA (Pink)		Discuss with Haem Consultant Require FBC, retics, blood film and a sample as a travel control Referred to London by special post **Prior arrange with lab**
Molecular Genetics (MOLGEN)	Capillary or venous blood	4 ml EDTA (Purple)		Requires Genomic 'R' Code Referred to LWH, daily courier used
MRD Flow Cytometry (MRD Flow) for AML or APML	Marrow Venous blood	4 ml EDTA (Purple) 20 mL Blood EDTA (Purple)		Discuss with Haem Consultant; referred to Bristol and London by special post; **prior arrange with lab**. Discuss with Haem Consultant; referred to Bristol/ London by special post; **prior arrange with lab**
MRD Molecular (MRD MOLECULAR) for AML or APML	Marrow Venous blood	4 ml BM EDTA (Purple) 20 mL Blood EDTA (Purple)		Discuss with Haem Consultant; referred to Bristol/ London by special post; **prior arrange with lab** Discuss with Haem Consultant; referred to Bristol/ London by special post; **prior arrange with lab**
MRD Flow Cytometry (MRD Flow) for ALL	Bone marrow	4 ml EDTA (Purple)		Discuss with Haem Consultant; referred to Bristol by special post; **prior arrange with lab**
MRD Molecular (MRD MOLECULAR) for ALL	Bone marrow	4 ml EDTA (Purple)		Discuss with Haem Consultant; referred to Bristol by special post; **prior arrange with lab**
Neutrophil Oxidative Burst/ Function/ DHR (NEUT RESP BURST)	Venous blood	10 ML HEPARIN (Orange)		Referred to Immunology, Manchester FT; requires courier and **a control sample; prior arrange with lab**
NF1/2 (MOLGEN) (R376)	Capillary or venous blood	4.0 ML EDTA (Purple)		DO NOT FRIDGE. SEND DIRECT TO MANCHESTER- ERS COURIER
NGS (HODS)	Capillary or venous blood	4.0 ML EDTA (Purple)		Referred to HODS, LCL.; requires courier and HODS episode ID
Nucleated red cell count (NRBC)	Capillary or venous blood	0.5 ml in EDTA (Pink)		Performed as part of FBC, but can be displayed separately

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Perforin expression (PERFORIN) Includes Perforin, sCD25, granule release assay, SAP, XIAP	Capillary or venous blood	10 ml EDTA patient + 10 ml EDTA control (Purple). sCD25 1 ml plain (white)	Discuss with Haem Consultant - not to be ordered on weekends; **prior arrange with lab**
Platelet function tests (PLT FUNCTION)	Venous blood only	10.0 ml Citrate (Green)	Discuss with Haem Consultant; requires courier; **prior arrange with lab**
Platelet Nucleotides (PLT NUCLEOTIDES)	Venous blood only	10.0 ml Citrate (Green)	Discuss with Haem Consultant; requires courier; **prior arrange with lab**
PLT glycoprotein (PLT GLYCOPROT)	Venous blood only	3 x 1.3 ml Citrate (Green) Manchester 10.0 ml Citrate (Green) Leeds	Discuss with Haem Consultant; requires courier; **prior arrange with lab**
PNH SCREEN (PNH SCREEN)	Capillary or venous blood	4.0 ML EDTA (Purple) minimum 2 ml	Discuss with Haem Consultant, referred to HODS, LCL. Requires courier and HODS episode ID.
Protein C Assays (PROTIEN C ASSAY)	Venous/ arterial blood only	1.3 ml Citrate (Green)	Part of Thrombophilia screen Referred to LCL. Daily courier used.
Protein S Assays (PROTEIN S ASS)	Venous/ arterial blood only	1.3 ml Citrate (Green)	Part of Thrombophilia screen Referred to LCL. Daily courier used.
Prothrombin Gene Mutation (PGM)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Part of Thrombophilia screen Referred to LCL. Daily courier used
Prothrombin time PT / INR (INR (PT))	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted
Prothrombin time 50:50 mix (PT 50:50)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted
Pyruvate Kinase assay (PK assay)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Referred to St Mary's, London. Requires an FBC and reticulocyte count result with a blood film and a control sample to monitor transport conditions; **prior arrange with lab**
REFACTO Assay (REFACTO)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted ONLY for patients on ReFacto AF
Referred slide (REFERRED)	Capillary or venous blood	N/A glass slide	Discuss with Haem Consultant Referred from external trusts for review of peripheral morphology
Reptilase time (RT)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Capillary samples are not permitted
Reticulocytes (RETICS)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Pair with FBC
Rheumatoid Factor (RALATEX)	Capillary or venous blood	1.3 ML PLAIN TUBE (White)	This test is performed at Alder Hey, so requires a separate sample
SAP [SLAM Associated Protein] (PERFORIN) (TBEXTENDED)	Capillary or venous blood	2 ml EDTA (patient + control) (Purple) / 0.5 ml in EDTA (Pink)	Discuss with Haem Consultant; **prior arrange with lab**
Sickle screening test (S)	Capillary or venous blood	0.5 ml EDTA (Pink)	Must request FBC also Result will reflex Haemoglobinopathy screen (HB ELECTRO)
Spherocytosis screen (5EMA) (SPHERO SCREEN)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Discuss with Haem Consultant; **prior arrange with lab**
SNP Array (SNP ARRAY)	Capillary or venous blood	4.0 ML EDTA (Purple)	Requires Genomic 'R' Code Referred to LWH, daily courier used
T and B Lymphocyte subsets (TBLYMPHS)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Must order FBC for WBC & lymphs
T and B Extended Subset (TBEXTENDED)	Capillary or venous blood	0.5 ml in EDTA (Pink)	Referred to Newcastle. Requires courier; **prior arrange with lab**
Telomere Length (TELOMERE)	Capillary or venous blood	4.0 ML EDTA (Purple)	Discuss with Haem Consultant; referred to Cardiff; **prior arrange with lab**
Thrombin time (TT)	Venous/ arterial blood only	1.3 ml in Citrate (Green)	Venous Blood

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Thrombophilia Screening tests (THROMBO SCREEN) -PC, PS, AT, APCR, FVL, PGM, ACA, LUPUS	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Capillary samples are not permitted Referred to LCL on ice Tues & Thurs
	Venous/ arterial blood only	0.5 ml in EDTA (Pink)		Used for FVL PGM PCR; referred to LCL, daily courier used
vW Multimer analysis (VWMULTIMER)	Venous/ arterial blood only	3 x 1.3 ml Citrate (Green)		Discuss with Haem Consultant. Request Collagen Binding Assay also Referred to Sheffield, requires courier; **prior arrange with lab**.
Von Willebrand factor assays (VON WILLEBRANDS)	Venous/ arterial blood only	3 x 1.3 ml in Citrate (Green)		Capillary samples are not permitted Includes vW activity, vW Ag, FVIII and CS
Warfarin Clinic INR (WCINR)	Capillary sample ONLY	N/A		Cardiac Liaison Nurses ONLY
Whole Genome Sequence (WGS)	Capillary or venous blood	4.0 ML EDTA (Purple)		Requires Genomic 'R' Code Referred to LWH, daily courier used
Whole Genome Sequence Malignant (WGS.MALIG)	Capillary or venous blood	0.5 ml in EDTA (Pink)		Pair with Histology sample as sent direct to Manchester, ERS Courier
XIAP [X-linked inhibitor of apoptosis] (PERFORIN) (TBEXTENDED)	Capillary or venous blood	2 ml EDTA (patient + control) (Purple)	0.5 ml in EDTA (Pink)	Discuss with Haem Consultant; not performed on females; **prior arrange with lab**

If the test required is not listed, please contact the Haematology Laboratory. From outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option 2. Internally, dial 4989, then option 2.

Blood Transfusion Test Requirements

To ensure patient safety, the transfusion laboratory requires the patient to have had blood group testing performed on more than one occasion prior to issuing blood products. The two separate samples for Group and Antibody screen must have been taken at least 30 minutes apart, i.e. at different phlebotomy sessions.

The primary grouping test for any patient over 4 months of age is the Full Group and Antibody Screen (FGAS). This consists of a forward blood group, reverse blood group and antibody screen. All parts must be completed to determine an initial blood group. A Confirm Group and Antibody Screen (CGAS) is the secondary grouping test and must be completed in full to confirm the primary blood group and provide group specific blood products. Adequate sample volume is critical.

Patients less than 4 months of age are confirmed by independent neonatal and check groups, but will require a Full Group and Antibody Screen once 4 months old.

Test name (Meditech Order)	Specimen type	SAMPLE REQUIRED / TUBE LID COLOUR	SPECIAL REQUIREMENTS
Blood group and antibody screen (FGAS, CGAS)	Venous/ arterial blood	> 4months 4.0 ml EDTA (Purple)	3-4 ml required If blood group *unknown*, send Full Group and Antibody Screen (FGAS) then Confirm group and Antibody Screen (CGAS) with request forms
Direct Antiglobulin test (DAT)	Venous/ arterial blood	> 4months 4.0 ml EDTA (Purple)	Transfusion history required
Neonatal Group and DAT (GRP DAT)	Capillary, cord or venous blood	< 4months 1.0 ml EDTA (Lilac)	Can be capillary If blood group *unknown*, send twice, 30 mins apart with request forms
Antibody ID (ABID) – order FGAS	Venous/ arterial blood	4.0 ml EDTA (Purple)	Additional 4 ml sample may be required to refer to NHSBT for confirmation
Crossmatch (compatibility testing to provide red blood cells for transfusion includes CGAS) Blood Adult~200 ml (ADULT RBC)	Venous/ arterial blood	> 4months 4.0 ml EDTA (Purple)	3 ml + 0.5 ml per unit required

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Crossmatch (compatibility testing to provide red blood cells for transfusion includes G&S) Blood Paediatric~50 ml (PAED RBC)	Venous/ arterial blood	> 4months 4.0 ml EDTA (Purple)	3 ml + 0.5 ml per unit required
Crossmatch (compatibility testing to provide red blood cells for transfusion includes blood group) Blood Paediatric~50 ml (PAED RBC)	Capillary or venous blood	< 4months 1.0 ml EDTA (Lilac)	1 ml + 0.5 ml per unit required, can be capillary
Platelets for transfusion PLATELETS - Adult dose ~ 220Ml (ADULT PLT) PLATELETS - Paediatric ~50Ml (PAED PLT)	Venous/ arterial blood > 4 months old Capillary < 4 months old	If patient's blood group is *unknown*, send 2 separate samples for blood group and antibody screen (FGAS) for group specific issue	If patient's blood group is confirmed, no sample is required
FFP for transfusion FFP - Adult dose~ 270Ml (ADULT FFP) FFP - Paediatric dose ~ 44Ml (PAED FFP)	Venous/ arterial blood > 4 months old Capillary < 4 months old	If patient's blood group is *unknown*, send 2 separate samples for blood group and antibody screen (FGAS) for group specific issue	If patient's blood group is confirmed, no sample is required
Octaplas for transfusion OCTAPLAS (Sterile FFP) ~200mls (OCT)	Venous/ arterial blood > 4 months old Capillary < 4 months old	If patient's blood group is *unknown*, send 2 separate samples for blood group and antibody screen (FGAS) for group specific issue	If patient's blood group is confirmed, no sample is required
Cryoprecipitate for transfusion CRYO - Adult pack ~ 200 Ml (ADULT CRYO) Cryoprecipitate ~ 44mL (PAED CRYO)	Venous/ arterial blood > 4 months old Capillary < 4 months old	If patient's blood group is *unknown*, send 2 separate samples for blood group and antibody screen (FGAS) for group specific issue	If patient's blood group is confirmed, no sample is required
Foetal Cell Detection (Kleihauer)	Venous/ arterial blood	4.0 ml EDTA (Purple)	State how much prophylactic anti-D has been given and linked to newborn 'W' number

Turnaround times

The department classifies its work as routine or urgent. All incoming work is classified as routine unless the requesting clinician contacts a member of staff in the department to inform them that work is to be undertaken urgently. The processing of the different categories of work is described below.

All URGENT requests should be preceded by a telephone call. If this relates to haematology or coagulation tests, then from outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option **2**. Internally, dial 4989, then option **2**. If it relates to the urgent provision of blood products, then from outside the hospital dial 0151-228-4811, then option 1, followed by extension 4989, option **3**. Internally, dial 4989, then option **3**. The laboratory will prioritise all URGENT requests.

URGENT requests for Blood Products for bleeding patients will be given priority over all other work.

In the event of a trauma call in A&E or major haemorrhage/ major incident, the Biomedical Scientist covering blood transfusion will be contacted via the hospital bleep system.

Routine Work

Routine requests within each work section are processed on a depending on clinical details and first in, first out basis.

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Urgent Work

The turnaround time given under the 'urgent' category is the minimum time needed to analyse a sample and the laboratory is fully staffed. Requests for urgent work should be made only if the patient is unstable and results are needed to decide on the immediate clinical management.

Work will be prioritised according to clinical urgency.

Out of Hours Work

The department provides a continuous 24-hour service with a restricted repertoire of tests available outside normal working hours. Outside normal working hours, Monday to Friday 09:00-17:30, one BMS provides cover for all of haematology, coagulation, blood transfusion and Specimen Reception.

The turnaround times quoted are measured from the time of the receipt of the specimen in the laboratory to reporting of the result. The department operates a programme for regular review of turnaround times.

Provision of blood products

Turnaround time for the provision of blood products is approximate and are timed from the receipt of a correctly labelled specimen in the appropriate container with sufficient blood volume. If there are special requirements e.g. irradiated products, or there are complicating factors e.g. red cell antibodies, there may be a delay in provision of appropriate blood products.

TEST	Turnaround times		
	Routine	Urgent	Out of Hours
Full Blood Count	4 hours	1 hour	1 hour
Differential WBC and blood film	4 hours	1 hour	1 hour
Glandular fever screening test	4 hours	1 hour	1 hour
Malarial parasites screen	4 hours	1 hour	1 hour
Sickle screening test	4 hours	1 hour	1 hour
Erythrocyte Sedimentation Rate	4 hours	75 min	Not processed
Nucleated red cell count	4 hours	1 hour	1 hour
Reticulocytes	4 hours	1 hour	1 hour
Bone marrow aspirates	2 days	Discuss with Consultant	Discuss with Consultant
G6PD screen	4 hours	1 hour	1 hour
Direct antiglobulin test	4 hours	1 hour	1 hour
Rheumatoid factor	1 week	Discuss with Laboratory	Not available
Haemoglobin HPLC	3 days	1 day	Discuss with Consultant
Aspirated Fluid Cytology	4 hours	1 hour	4 hours
Spherocytosis screen (5-EMA)	1 day	Discuss with Consultant	Not available
CD34 enumeration	1 day	Discuss with Consultant	Discuss with Consultant
Blood/ bone marrow/ CSF cell markers for leukaemia diagnosis	1 day	Discuss with Consultant	Discuss with Consultant
Helper/suppressor lymphocytes (T4:T8)	3 days	Discuss with Consultant	Discuss with Consultant
Lymphocyte subsets	3 days	Discuss with Consultant	Discuss with Consultant

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Clotting screen	4 hours	1 hour	1 hour
Prothrombin time INR	4 hours	1 hour	1 hour
APTT	4 hours	1 hour	1 hour
Thrombin time	4 hours	1 hour	1 hour
Reptilase time	4 hours	1 hour	1 hour
D-Dimer	4 hours	1 hour	1 hour
VWF activity	1 - 2 weeks	4 hours	Discuss with Consultant
VWF antigen	1 - 2 weeks	4 hours	Discuss with Consultant
Factor VIII, IX, XI, XII, II, V, VII, X, XIII.	1 - 2 weeks	Discuss with laboratory	Discuss with Consultant
APTT and PT 50:50 mixes	4 hours	1 hour	1 hour
Inhibitor FVIII and FIX assay	1 - 2 weeks	Discuss with laboratory	Discuss with Consultant
Platelet function test	Discuss with Consultant	Not available	Not available
Antithrombin	4 hours	1 hour	1 hour
Anti-Xa assay (LMWH, UHF)	4 hours	1 hour	1 hour
Blood group	4 hours	1 hour	1 hour
Direct Antiglobulin Test	4 hours	1 hour	1 hour
Antibody screen	4 hours	1 hour	1 hour
Antibody panels	4 hours	2 hours	2 hours- depends on workload
Compatibility testing and provide cross matched red cells for transfusion	4 hours	1 hour	1 hour- depends on workload
Provide red cells for transfusion in emergency situations when time does not allow cross matching. **2 units of O Negative blood are available for emergency use in the Laboratory Issue fridge, Theatre fridge AHCH and 4 paediatric units in NICU fridge, LWH**		**10 min**	**10 min**
Issue Platelets for transfusion	4 hours	10 min (if available in the Trust and group known)	20 min (if available in the Trust)
Issue FFP/ Octaplas for transfusion	45 min	20 min	20 min
Issue Cryoprecipitate for transfusion	45 min	20 min	20 min
Kleihauer	1 day	4 hours	4 hours

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Reference ranges

Haematology Reference Ranges

Common tests reference ranges are listed below. For more specialist tests please contact the Haematology department or Consultant Haematologists for advice.

	1 day	3 day	1 week	2 weeks	1 month	2 months	6 months	1 year	2 years	4 years	8 years	16 yrs (f)	16 yrs (m)
Hb g/L	140-220	140-220	130-210	125-205	100-170	90-135	100-141	100-141	100-148	100-148	115-158	118-160	129-171
WBC *10^9/L	9.0-18.4	9.0-18.4	5.0-18.4	5.0-18.0	5.0-18.0	5.0-18.0	5.0-17.0	5.0-17.0	5.0-17.0	6.3-16.2	4.9-13.7	3.9-9.9	3.9-9.9
PLT*10^9/L	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400	150-400

RBC*10^{12}/L	3.8-6.5	3.8-6.5	3.2-6.4	3.2-6.4	2.8-5.3	2.6-4.3	3.6-5.0	4.1-5.3	4.0-5.0	4.0-5.0	4.0-5.2	3.88-4.99	4.3-5.6
HCT	0.45-0.67	0.45-0.67	0.42-0.66	0.39-0.63	0.31-0.55	0.28-0.42	0.30-0.41	0.30-0.41	0.31-0.43	0.31-0.43	0.34-0.47	0.35-0.46	0.37-0.50
MCV fl	98-130	94-130	88-120	86-120	85-120	77-115	72-95	73-90	73-90	74-88	76-92	80-98	80-98
MCH pg	31.0-39.0	30.0-37.0	28.0-37.0	28.0-37.0	27.0-36.0	29.0-34.0	25.0-33.0	24.0-32.0	23.0-32.0	25.0-32.0	25.0-33.0	27.0-33.0	27.0-33.0
MCHC g/L	300-360	300-360	280-360	280-360	290-365	290-365	300-365	300-365	300-365	310-365	310-365	315-355	315-365
RDW %	1.5-14.8	11.5.14.8	11.5.14.8	11.5.14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8	11.5-14.8
NEUTs*10^9/L	4.8-17.1	2.0-9.4	1.8-8.0	1.7-6.0	1.0-9.0	1.0-9.0	1.0-8.5	1.5-8.5	1.5-8.5	1.6-9.0	1.4-7.5	1.4-5.7	1.4-5.7
LYMPHs*10^9/L	2.0-7.3	2.0-7.3	2.8-9.1	2.8-9.1	3.0-13.5	3.0-13.5	4.0-13.5	4.0-10.5	3.0-9.5	2.0-8.0	1.5-7.6	1.2-3.8	1.2-3.8
MONOs*10^9/L	0.06-1.9	0.06-1.9	0.06-1.7	0.06-1.7	0.06-1.7	0.06-1.7	0.06-1.3	0.06-1.3	0.06-1.3	0.06-1.3	0.06-1.3	0.15-1.28	0.15-1.28
EOSINs*10^9/L	0-0.8	0-0.8	0-0.9	0-0.8	0-0.8	0-0.8	0-0.8	0-0.8	0-0.8	0-0.8	0-0.75	0.0-0.76	0-00-0.76
BASOs*10^9/L	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
MYEL0s*10^9/L	0-0.1	0-0.1	0-0.1	0	0	0	0	0	0	0	0	0	0
NRBC %	2	2	0	0	0	0	0	0	0	0	0	0	0
RETIC %	3-7	1-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3	0.4-3
ESR mm in 1 hour	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-8

Haematology Reference ranges (specific to analyses performed at Alder Hey Children's Hospital) are compiled from ranges published in Practical Paediatric Haematology by Hinchcliffe and Lilleyman, and Blood Cells: a Practical Guide by Barbra Bain and Nathan and Oski's Paediatric Haematology.

Coagulation Reference Ranges

	From 0 days	From 3 days	From 1 month	From 3 month	From 6 month	From 1 year
PT (secs)	8.6 – 13.5	8.1 – 13.0	7.9 – 12.0	8.2 – 12.1	9.1 – 11.8	9.8 – 11.4
APTT (secs)	25.4 – 44.1	23.8 – 45.2	20.7 – 44.7	19.5 – 40.6	22.8 – 34.7	24.2 – 30.2
Fibrinogen g/L	1.6 – 3.8	1.6 – 4.4	1.6 – 3.6	1.1 – 3.6	1.1 – 3.7	1.8 – 3.5
Thrombin Time (secs)	13.1 – 19.8	11.9 – 20.4	13.6 – 20.4	14.4 – 20.8	13.9 – 21.8	15.6 – 19.6
Reptilase Time (secs)	16.3 – 18.7	16.3 – 18.7	16.3 – 18.7	16.3 – 18.7	16.3 – 18.7	16.3 – 18.7
D Dimer ng/mL FEU	<500	<500	<500	<500	<500	<500
Antithrombin	51-75	From 5 days 54-80	63-93	63-93		85-129
Clotting Factor Assays	Discuss	with	Consultant	Haematologist		

Special Haematology

	1day	1 month	1 year	60 year
HbA, HbA2, HbC, HbD, HbF, HbS	Discuss	With	Consultant	Haematologist
Spherocytosis screen (5-EMA)	Discuss	With	Consultant	Haematologist
CD34 enumeration	Discuss	With	Consultant	Haematologist

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Blood/ bone marrow/ CSF cell markers for leukaemia diagnosis	Discuss	With	Consultant	Haematologist
Rheumatoid Factor iu/ml	0 – 15	0 – 15	0 – 15	0 – 15
Lymphocyte subsets	Discuss	With	Consultant	Immunologist

Blood Product Volumes

This table indicates the typical volumes for each product type

Blood Product	Volume (ml)	Anticoagulant	Haematocrit
Concentrated red cells	280 – 420	CPD/SAG-M	0.5 – 0.7
Red cells (Paediatric pack)	45	SAG-M	0.5 – 0.7
Octaplas (including FFP standard pack)	200 – 340		
FFP (Paediatric pack)	45 – 85		
Cryoprecipitate	20 – 40		
Platelets (1 adult dose)	150 – 350		
Platelets (single Paediatric pack)	40 - 70		

Referral Laboratories

The Haematology department refers samples to the following laboratories for analysis:

Referral Laboratory	Address	Referring Section	Investigations referred	Turnaround time
Genetics Laboratory Liverpool Women's Hospital Genetics Laboratory St Mary's Hospital, Manchester	North West Genomic Laboratory Hub – Liverpool Site Manchester Centre for Genomic Medicine, Sample Reception (2nd Floor) Liverpool Women's Hospital Crown Street Liverpool L8 7SS Tel: 0151 702 4228 Email: mft.genomics@nhs.net North West Genomic Laboratory Hub – Manchester Site Manchester Centre for Genomic Medicine, Sample Reception (6th Floor) St Mary's Hospital Oxford Road Manchester M13 9WL Tel: 0161 276 6122 Email: mft.genomics@nhs.net	Routine Haematology	CF Gene Analysis Microarray Karyotyping FISH Molecular Genetics Whole Genome Sequence Constitutional DNA storage Newborn Screening DNA Fragile X Whole Genome Sequence-Malignant SNP NF1/2- direct to Manchester	Urgent FISH 3 days Karyotyping and Microarray 28 days Non-urgent gene panels 84 days
Immunology Laboratory Manchester Royal Infirmary	Greater Manchester Immunology Service Division of Laboratory Medicine Clinical Sciences Centre Manchester Royal Infirmary Oxford Road Manchester M13 9WL	Special Haematology Coagulation	Neutrophil oxidative burst/ Neutrophil Function/ DHR Platelet glycoproteins	2 days 2-3 days

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Immunology Laboratory Royal Liverpool University Hospital	Immunology Department Liverpool Clinical Laboratories CSSB Liverpool University Hospitals NHS Foundation Trust – Royal Liverpool Site Mount Vernon Street Liverpool L7 8YE Liverpool University Hospitals Foundation Trust.	Special Haematology	Adrenal Gland Ab Anti-Cardiac Muscle Ab Anti-Centromere Ab Anti-double stranded DNA Anti-double stranded DNA Titre Anti-Enterocyte Ab Anti-Extractable Nuclear Ag Anti-Gastric Parietal Cell Ab Anti-Glomerular Membrane Ab Anti-Mitochondrial Ab Anti-Neutrophil Cytoplasmic Ab (PR3/ MPO) Anti-nuclear antibodies Anti-Skin Ab Anti-Smooth muscle Ab Anti-Striated Muscle Ab Auto Antibody Screen C1 Esterase profile C1 Esterase Inhibitor Function Intrinsic Factor Ab Liver Auto Antibodies Liver/Kidney Microsomal Ab <u>Tissue Typing</u> HLA B27 HLA B51 HLA Class 1 (A, B, C) type HLA Class II (DQ, DR) type HLA DQ2 and HLA DQ8	21 days
Flow Cytometry Laboratory Royal Victoria Infirmary Newcastle	Department of Blood Sciences - RVI Level 3 Leazes Wing Royal Victoria Infirmary Queen Victoria Road Newcastle upon Tyne NE1 4LP	Special Haematology	Extended T&B Subsets FOXP3 Lymphocyte function assay XIAP for Very Early Onset bowel disease and X-linked proliferation screen	1 week
Specialist Haematology St Mary's Hospital London	Specialist Haematology, 2nd Floor Mint Wing, St Mary's Hospital, Praed Street, London, W2 1NY	Routine Haematology	G6PD Pyruvate Kinase Methaemoglobin	10-21 days

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Red Cell Immunohaematology Laboratory Liverpool NHSBT	NHS Blood and Transplant Liverpool 14 Estuary Banks Speke Liverpool L24 8RB Receiving hub for referral to other NHSBT centres i.e. Bristol, Barnsley	Transfusion	RCI Blood Grouping problems Extended RBC phenotype Haemolytic Disease of the newborn FMH quantitation Crossmatch of RBCs DAT investigation Antibody confirmation Cold agglutinins H&I Platelet Refractoriness: HLA antibody testing and typing Haemolytic and non-haemolytic transfusion reactions Investigate TRALI Organ Transplant (Patients and Donors) Haematopoietic Stem Cell Transplantation (Recipients & Donors) Platelet Immunology Granulocyte immunology HLA disease association/ Drug Hypersensitivity / H&I Research RBC genotyping IBGRL Elucidation of rare or novel blood group antigens Antibody identification when unable to elucidate a serological incompatibility Molecular Diagnostics for sickle cell, thalassaemia and rare inherited anaemia Fetal genotyping	Varied
Specialist Haemostasis St James's University Hospital	Pathology Department Block 32 Chancellor's Wing St James's University Hospital Beckett Street Leeds LS9 7TF	Coagulation	Platelet function testing Platelet glycoproteins Platelet nucleotides	1 month

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Coagulation Laboratory Royal Liverpool University Hospital	Haematology Department Clinical Support Services Building, Royal Liverpool University Hospital, Mount Vernon Street Liverpool L7 8YE 0151 706 4967	Coagulation	ADAMTS 13 Activity and inhibitor Anti Beta 2 Glycoprotein 1 Ab's Anticardiolipin Antibodies Antithrombin activity and antigen APCR Collagen Binding Assay Factor V Leiden HIT screen LUPUS screen Protein C activity and antigen Protein S activity, antigen and free Prothrombin Gene Mutation	1-3 weeks
Diagnostic Laboratory Liverpool School of Tropical Medicine	Liverpool School of Tropical Medicine Pembroke Place Liverpool L3 5QA 0151 708 9393	Routine Haematology	Malaria Parasite confirmation	1 day
Haematology Laboratory Birmingham Children's Hospital	Haematology Department Medical Laboratory Block Birmingham Children's Hospital Whittal Street B4 6NH 0121 333 9805	Special Haematology	5-EMA sample sharing	3 days
Immunology Department GOSH Histopathology Department GOSH Haematology Department GOSH	Laboratory Medicine Camelia Botnar Laboratories Great Ormond Street Hospital for Children NHS Trust Great Ormond Street London WC1N 3JH	Special and Routine Haematology	CAR-T cell monitoring Granule Release assay Perforin Soluble CD25 SAP XIAP Hermansky-Pudlak Syndrome-electron microscopy Isohaemagglutinin titres IgM	1 month
Coagulation Laboratory Royal Hallamshire Hospital	Royal Hallamshire Hospital Glossop Road Sheffield S10 2JF	Coagulation	Factor VIII binding assay vW Multimers Collagen Binding Assay Plasminogen Alpha-2 antiplasmin	3 months
Bristol Genetics Laboratory Pathology Sciences	South West Genomic Laboratory Hub Bristol Genetics Laboratory Pathology Sciences Southmead Hospital Severn Pathology North Bristol NHS Trust Pathology Building, Southmead Hospital, Westbury-on-Trym Bristol BS10 5NB	Routine Haematology	MRD Molecular MRD Flow cytometry	1 month 1 day

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Haematology Oncology Diagnostics Service (HODS)	HODS Clinical Support Services Building, Royal Liverpool University Hospital, Mount Vernon Street Liverpool L7 8YE	Routine Haematology	Cell Markers PNH BCR-ABL NGS JAK2 (TP53 – MOL Biology, via HODS)	7-21 days
SYNNOVIS Molecular Oncology Diagnostics Unit (MODU) Guy's & St Thomas Hospital	Molecular Genetics 4th Floor Southwark Wing Guy's Hospital Great Maze Pond London SE1 9RT	Routine Haematology	AML/ APML (Marrows)	1 month
SYNNOVIS Haemostasis & Thrombosis Laboratories	5th Floor, North Wing, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH	Coagulation	HMWK and Pre-kallikrein	2 months
Transplantation Laboratory Manchester Royal Infirmary	Transplantation Laboratory 2nd Floor, Purple Zone Manchester Royal Infirmary Oxford Road Manchester M13 9WL	Routine Haematology	BMT HLA Typing BMT HLA specific antibody	2-15 days

The Laboratory complaints procedure

The laboratory operates a Quality Management System to ensure that the needs and requirements of our users are met. In order to improve the service you receive from the laboratory, it is helpful to us if you keep us informed of any laboratory-related problems which have been detrimental to good clinical practice.

As the user of the service, you may be able to offer suggestions about our procedures, requirements for new services or changes in practice which may be helpful to you. Please direct comments to the appropriate Consultant, Pathology Manager, Laboratory Leads or Quality Manager. Regular User Group meetings are held to ensure that the requirements of users of our service are met by obtaining feedback and recommendations on quality improvements.

We aim to provide the very best service, but unfortunately we may not always get it right and sometimes things go wrong. It is important that we are informed about problems with our service as soon as possible. Please contact the Head of Department, preferably by direct visit or telephone as soon as an issue is identified. In the absence of the Head of Department, refer the matter to the Pathology Manager or other appropriate member of staff and write to either the Head of Department or the Quality Manager. Alternatively, you can write to the Clinical Director for Pathology, Medical Director, or to the Chief Executive of the Trust.

Wherever possible the matter will be dealt with the same day but not all issues can be resolved immediately, and some may be more serious or require a longer period of investigation and assessment within the department. Details of all complaints are recorded and reviewed by our Laboratory Medicine Governance Committee. If a written complaint is received, a written reply will be given.

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