

## Department of Haematology

# Haematology and Blood Transfusion Laboratory Handbook

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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 and General Haematology.

The department undertakes all aspects of paediatric haematology and acts as a regional referral centre for haemophilia, 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 90000 full blood counts per year including visual white cell differential counts, ESR, Glandular fever screening tests and Sickie screens. The section also assists in the collection, preparation and staining of bone marrow samples.

Our aim here is to provide:

- A timely and accurate screening 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 18000 coagulation screens and 1000 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 a consultant haematologist).
- Monitoring Heparin therapy using the APTT or specific Heparin assay for patients receiving Low Molecular Weight Heparin (LMWH).
- 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 III, protein S, protein C, resistance to activated protein C, anti-cardiolipin antibody, factor V Leiden and factor II 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**

This section offers the following services:

- Routine blood grouping and antibody screen with identification of antibodies. Any atypical antibodies identified are referred to the Regional Blood Transfusion Service for confirmation.
- 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 National Blood Service.  
**N.B. Always inform the laboratory of Urgent or Emergency cross-match and blood product requests by telephone 0151-252-5492 (internal extension 2492/2490)**
- 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.

### **Special Tests Section**

Immunosuppressant drug monitoring is performed in support of the renal unit and bone marrow transplantation. The regional leukaemia and oncology unit is supported with a rapid diagnostic service comprising of immunophenotyping. The service provided also includes;

Provision of the Regional Neonatal Sickle Cell Screening service, haemoglobin studies such as sickle tests, haemoglobin electrophoresis and thalassaemia screen. If a haemoglobinopathy is diagnosed, follow up clinical support is provided by the Consultant Haematologist and clinical team.

- Cell surface markers in the investigation and diagnosis of leukaemia and immune disorders.
- Other special investigations include special stains for haematological malignancies.
- Assays for anti-rejection drugs including Cyclosporin and Tacrolimus.

*These special tests are best 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.

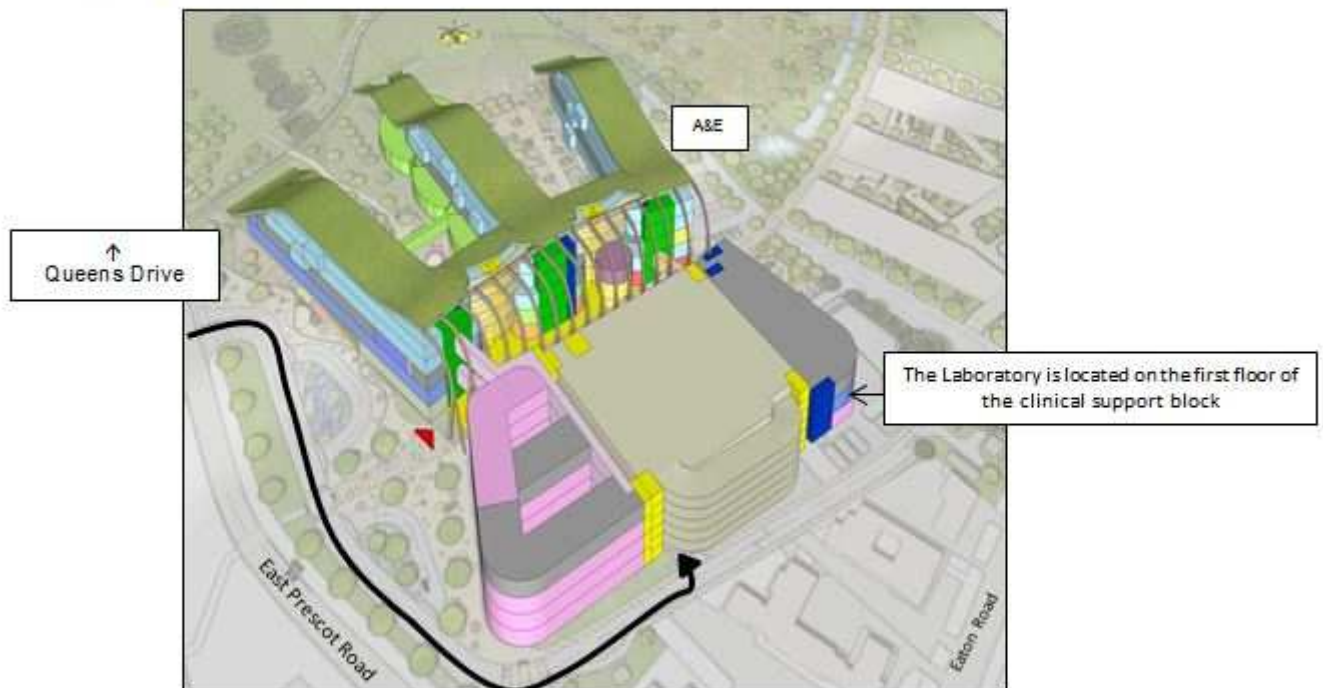
**“Urgent request for blood products” will be prioritised.**

## **Where to find us**

The Haematology departments are 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.

## **Where to find us:**



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

## **Making requests**

**All URGENT requests should be preceded by a telephone call to the haematology department on 0151-252-5490 (internal extension 2490 for Haematology, 2942 for Transfusion). The laboratory will prioritise all URGENT requests.**

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

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, hand written using the specific Alder Hey Pathology request forms or ICE forms, ensuring that details entered on the request form are legible.

Request forms must contain as a minimum

- I. Patient's name
- II. NHS Number or Address
- III. Hospital Unit number (case sheet number ) where available
- IV. Date of birth
- V. Ward/Clinic
- VI. Date of sample
- VII. Type of sample
- VIII. Consultant /GP name / contact details of requesting doctor
- IX. Investigations required
- X. Products requested (for blood transfusion)
- XI. Date and time required (for blood transfusion)
- XII. Clinical details
- XIII. Special product requirements e.g. CMV negative
- XIV. Urgency of request

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

- I. Patients Gender
- II. Sample type
- III. Signature of person taking sample
- IV. 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.
- Interpret the results against an appropriate age specific reference range.

Samples should be collected in accordance with the **Trust Policy for Capillary Blood Collection C30**

## 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 cross-match 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.
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 cross-matching 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 3.30pm
- iii. Samples arriving after the designated times may be subject to Consultant review.

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.
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 for which the request was made. If your patient has been transfused, a fresh sample for further cross-matching will be required after 3 days. Please give as much time as possible for the lab to complete grouping, antibody screening and/or cross-matching, 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 cross-match 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 An A/E number is only acceptable for identification purposes on requests for cross-matching of blood for IMMEDIATE transfusion, not for group and save serum samples.

**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

- 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

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.
- that are contaminated with blood or bodily fluids.
- that 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.

## 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 2 hours from the time collected to ensure the stability of the sample and analytes to be tested. If samples are received more than 2 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.

### 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.

### Within the hospital

Samples collected within the hospital should be transported to the laboratory 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 A infectious substances

Please note that Category A 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

## 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 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).

## Seeking Advice

### Enquiring about sample types and amounts

See link for test [repertoire](#) or contact the laboratory on 0151 252 5490 (internal extension 2490). The sample volumes indicated are the minimum required but it is helpful if larger volumes can be supplied to enable repeat testing if required. If inadequate sample volumes are provided, it may be necessary to delete those tests from the profile that require large amounts of sample. If there are clinical reasons for giving preference to specific analytes please indicate this clearly on the request and/or telephone the department to discuss your requirement.

### Additional investigations.

If additional investigations are required on specimens already sent to the laboratory, please contact the laboratory to establish if sufficient sample remains and it is suitable for analysis. Telephone requests for additional investigations must be followed up by a written request form (back of a standard specimen bag) providing the patient details, test/tests required and details of the laboratory staff the request was discussed with.

### Key contacts

<b>Haematology Medical Staff</b>		Internal extension	Direct Dial
Consultant Haematologist (Head of Department)	Dr Mark Caswell	Secretary Ext 3680	Via switchboard
Consultant Haematologist	Dr Russell Keenan	Secretary Ext 3680	Via switchboard
Consultant Haematologist	Dr Banurekha Thangavelu	Secretary Ext 3680	Via switchboard
<b>Haematology Biomedical Scientists(BMS)</b>			
Laboratory Manager/Lead BMS	Mr Ray Billington	Ext 2263	0151 252 5229
Senior BMS Coagulation	Mr Andrew Simpson	Ext 2260	0151 252 5490
Senior BMS Routine Haematology	Mrs Sarah Baker	Ext 2490	0151 252 5490
Senior BMS Special Haematology	Mr Paul Walsh	Ext 2559	0151 252 5490
Senior BMS Blood Transfusion	Mrs Janet Fu	Ext 2492	0151 252 5492
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 laboratory can be contacted at any time for technical advice on 0151 252 5940 (internal extension 2490) and the duty Consultant Haematologist 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 doctor.

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. Additional time has to be allowed for appropriate transport of specimens. Please contact the Haematology laboratory for more detailed information.

### **Reference Ranges**

It is important to understand that reference ranges are age (and in some instances sex) 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. To view the reference ranges follow the link [ranges](#).

### **Quality Control**

The quality of results is controlled by internal quality control procedures and monitored by [external quality assessment](#). The Haematology department participates in external quality assurance and proficiency schemes from the UK (UKNEQAS).

### **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) 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. For more detailed information on interferences please contact the Haematology laboratory ext 2490.

**Test repertoire and sample requirements.**

The main sample tubes used in Haematology are shown below. If the tube you require is not shown please contact the laboratory for advice.

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 specimen should be collected first followed by any tube containing anticoagulants followed by plain (no anticoagulant) tubes. 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**

TEST	Specimen type	SAMPLE REQUIRED / TUBE COLOUR	SPECIAL REQUIREMENTS
ACA	Blood	2 X 1.3ML CITRATE SAMPLES	Venous Blood
ADAMTS 13 Assay	Blood	1.3 ML CITRATE	Venous Blood
ADAMTS-13 Inhibitor	Blood	2 X 1.3ML CITRATE SAMPLES	Venous Blood
Adrenal glandAb	Blood	1.3 ML PLAIN TUBE (White)	
AMA ab	Blood	1.3 ML PLAIN TUBE (White)	
ANCA	Blood	1.3 ML PLAIN TUBE (White)	
Ant GBM Ab	Blood	1.3 ML PLAIN TUBE (White)	
Anti Cardiac Muscle Ab	Blood	1.3 ML PLAIN TUBE (White)	
ANTI ds DNA	Blood	1.3 ML PLAIN TUBE (White)	
Anti ENA	Blood	1.3 ML PLAIN TUBE (White)	
Anti Enterocyte	Blood	1.3 ML PLAIN TUBE (White)	
ANti IF Ab	Blood	1.3 ML PLAIN TUBE (White)	
Anti MyositisAb	Blood	1.3 ML PLAIN TUBE (White)	
Anti Nuclear Ag	Blood	1.3 ML PLAIN TUBE (White)	

Anti Skin Ab	Blood	1.3 ML PLAIN TUBE (White)	
Anti Xa assay ( LMWH, UHF)	Blood	1.3 ml in Citrate (green)	Venous Blood
Anti-Cardiolipin Assay	Blood	1.3 ml Citrate (green)	Venous Blood
Antithrombin III	Blood	1.3 ml in Citrate (green)	Venous Blood
APTT	Blood	1.3 ml in Citrate (green)	Venous Blood
Asp Maintenance	Blood	4 ml EDTA	
Asparaginase	Blood	4 ml EDTA	
AUTO AB SCREEN	Blood	1.3 ML PLAIN TUBE (White)	
Autoimmune Hep	Blood	1.3 ML PLAIN TUBE (White)	
BCR ABL	Blood	4.0 ML EDTA	Discuss with Haem Consultant
BMCELLBLD	Blood	5 ml EDTA	Contact Haematology
BMCELLBM	Bone Marrow	5 ml ACD	Contact Haematology
BMCELLCSF	CSF	6 drops CSF	Contact Haematology
Bone marrow aspirates.	Bone marrow	By special request	Contact Haematology
C1 Est Inh func	Blood	1.3 ML PLAIN TUBE (White)	
C1 Est profile	Blood	1.3 ML PLAIN TUBE (White)	
CDNA	Blood	3.0 ml EDTA	
Cell Bank	CSF	CSF	
Cell Bank	Marrow	Marrow ACD	
Cell Bank	Blood	Blood EDTA	
Cell markers for leukaemia diagnosis	Blood / bone marrow	By special request	Contact haematology
Centromere Ab	Blood	1.3 ML PLAIN TUBE (White)	
CF Gene	Blood	2.0 ml EDTA	
CF Gene Buccal Swab	Blood	Buccal Swab	
Clotting screen(PT/APTT/TT) (CS)	Blood	1.3 ml in Citrate (green)	Venous Blood
COAGULATION MOLECULAR GENETICS FVII, XIII	Blood	5 ML EDTA SAMPLE	Discuss with Haem Consultant



COAGULATION MOLECULAR GENETICS FVIII, FIX, VW	Blood	5 ML EDTA SAMPLE	Discuss with Haem Consultant
CSF cytology	CSF	0.5ml Universal tube	
Cyclosporin	Blood	1 ml EDTA	
Cytochemical stains	Blood / bone marrow	By special request	Discuss with Haem Consultant
Cytogenetics/ Microarray	Blood	3.0ml EDTA	
		4.0ml Heparin	
D Dimers	Blood	1.3 ml in Citrate (green)	Venous Blood
Differential WBC and blood film	Blood	(included in FBC where required)	
ds DNA titre	Blood	1.3 ML PLAIN TUBE (White)	
ESR	Blood	0.5 ml in EDTA (PINK)	
Factor VIII, IX, XI, XII, II,V, VII, X.	Blood	3*1.3 ml Citrate (green)	Venous Blood
Fragile X	Blood	3.0 ml EDTA	
		4.0 ml Heparin	
Full Blood Count.(FBC)	Blood	0.5 ml in EDTA (PINK)	
FVIII BINDING ASSAY	Blood	3*1.3 ml Citrate (green)	Venous Blood
FVL AND PGM MAY BE REQUESTED SEPARATELY	Blood	0.8 ml EDTA	
G6PD	Blood	1.3ML EDTA (Pink)	
G6PD and PK	Blood	1.3ML EDTA (Pink)	
G6PD screen/assay	Blood	1.0 ml in EDTA (PINK)	
Gastric PC Ab	Blood	1.3 ML PLAIN TUBE (White)	
Glandular fever screening test.	Blood	0.5 ml in EDTA (PINK)	
Haemoglobin electrophoresis	Blood	0.5 ml in EDTA (PINK)	
HbH	Blood	0.5 ml in EDTA (PINK)	
HbS screening test.	Blood	0.5 ml in EDTA (PINK)	
Hemansky-Pudlak Syndrome	Blood	5 ml EDTA	Arrange with Haematology Nurses
Hepcidin	Blood	1.3 ML PLAIN TUBE (White)	

HLA B27	Blood	4.0 ML EDTA 1.3ml from Neonate	
HLA B51	Blood	4.0 ML EDTA 1.3ml from Neonate	
HLA class 1	Blood	4.0 ML EDTA 1.3ml from Neonate	
HLA class II	Blood	4.0 ML EDTA 1.3ml from Neonate	
HLA DQ2:HLA DQ8	Blood	4.0 ML EDTA 1.3ml from Neonate	
HLH Protiens * (includes SAP/Perforin/Granule release assay)	Blood	10ml EDTA (patient + control)	Discuss with Haem Consultant - not to be ordered on weekends
Holotranscobalamin	Blood	1.0 ml PLAIN TUBE	
Factor VIII / IX Inhibitor assay	Blood	1.3 ml in Citrate (green)	Venous Blood
Factor VIII/IX Inhibitor screen	Blood	1.3 ml in Citrate (green)	Venous Blood
Karyotype Boy	Blood	2ml Heparin	
		2ml EDTA	
Karyotype Girl	Blood	2 ml Heparin	
		2ml EDTA	
LKM	Blood	1.3 ML PLAIN TUBE (White)	
<b>LUPUS SCREEN</b>	Blood	3 X 1.3ML CITRATE SAMPLES	Venous Blood
LUPUS Screen.	Blood	2*1.3 ml Citrate (green)	Venous Blood
Lymph Func	Blood	5 ml LI Heparin	
Lymphocyte subsets	Blood	0.5 ml in EDTA (PINK)	
Malarial parasites ID	Blood	1.3ML EDTA	
Molecular Genetics	Blood	3.0 ml EDTA	
Molecular Studies for Haemophilia	Blood	2.5 ml in EDTA (Pink)	
MRD AML	Marrow	5ml BM EDTA	
	Blood	20 mL Blood EDTA	
MRD APML	Marrow	5ml BM EDTA	
	Blood	20 mL Blood EDTA	
MRD Interfant	Blood	3-5 ml Marrow	

MRD Marrow	Bone Marrow	5 ml ACD	
Neutrophil OB	Blood	10 ML HEPARIN	
Perforin	Blood	5ml EDTA (patient + control)	Discuss with Haem Consultant - not to be ordered on weekends
PK assay / screen	Blood	1.3ML EDTA	
Platelet function test.	Blood	10.0 ml in citrate	Venous Blood - Arrange with Haematology
PNH SCREEN	Blood	4.0 ML EDTA	
PROTEIN C AND S AND ATIII MAY BE REQUESTED SEPARATELY	Blood	Order Thrombophilia screen.If ordered separately 1.3 ml Citrate (green) per test	Venous Blood
Prothrombin time INR	Blood	1.3 ml in Citrate (green)	Venous Blood
Quantification of Hb A2, HbS, HbF	Blood	0.5 ml in EDTA (PINK)	
Reptilase time	Blood	(included in CS where required)	
Reticulocytes.	Blood	included in FBC but MUST be requested 0.5 ml in EDTA (PINK)	
Rheumatoid factor	Blood	1.3 ML PLAIN TUBE (White)	
RICoF ( VWF activity )	Blood	1.3 ml in Citrate (green)	Venous Blood
SAP	Blood	5ml EDTA (patient + control)	Discuss with Haem Consultant - not to be ordered on weekends
Sirolimus	Blood	1 ml EDTA	
SMA Ab	Blood	1.3 ML PLAIN TUBE (White)	
StriatedMuscAb	Blood	1.3 ML PLAIN TUBE (White)	
Tacrolimus	Blood	0.5 ml in EDTA (PINK)	Performed Tuesday and Friday
TdT	Blood / bone marrow	By special request	Contact haematology
Thiopurine	Blood	4 ml EDTA	
Thrombin time	Blood	(included in CS where required)	
THROMBOPHILIA SCREEN(INCLUDES PROTEIN C AND S, ATIII, APCR , ACA, FVL AND PGM)	Blood	3 X 1.3ML CITRATE SAMPLES	Venous Blood
	Blood	2mL EDTA	
UKALL ASP	Blood	see Aspariginase	Discuss with Haem Consultant
UKALL MRD FLOW	Blood		Discuss with Haem Consultant
UKALL MRD FLOW BM	Blood	see MRD	Discuss with Haem Consultant

UKALL THIO	Blood	see Thiopurine	Discuss with Haem Consultant
Vacuolated Lymphocytes	Blood	2ml EDTA+3 unstained/1 stained films	
VON WILLEBRAND MULTIMERS	Blood	3 X 1.3ML CITRATE SAMPLES.	Venous Blood - Discuss with Haem Consultant
VWF antigen	Blood	1.3 ml in Citrate (green)	Venous Blood

**BLOOD TRANSFUSION**

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 red blood cells. The two separate samples for Group and Antibody screen must have been taken at different times, i.e at different phlebotomy sessions.

Blood group and antibody screen	Blood	> 4months 4.0 ml EDTA (Purple)	
Direct Antiglobulin test	Blood	> 4months 1.3 ml EDTA (Purple)	
Antibody screens	Blood	> 4months 4.0 ml EDTA (Purple)	
Antibody Identification panels	Blood	> 4months 4.0 ml EDTA (Purple)	
Compatibility testing to Provide Red Blood Cells for Transfusion for	Blood	Add 1.0 ml /unit of red cells required to the Blood group and screen specimen.	
Patient <4 months old		4.0 ml EDTA sample, Blood Group and Antibody screen specimen can be used.	
Patient > 4 months old	Blood		
Provide Platelets for transfusion		If Patients blood group is known no sample is required	If Patients blood group is <i>unknown</i> send 2 separate samples for Blood Group and antibody screen.
Provide Octaplas / FFP for transfusion		If Patients blood group is known no sample is required	If Patients blood group is <i>unknown</i> send 2 separate samples for Blood Group and antibody screen
Provide Cryoprecipitate for transfusion		If Patients blood group is known no sample is required	If Patients blood group is <i>unknown</i> send 2 separate samples for Blood Group and antibody screen
Kleihauers	Blood	2.5 ml EDTA (Pink/Red)	
Cold agglutinins <b>** DISCUSS WITH LAB BEFORE TAKING SAMPLE**</b>	Blood	4.0 ml EDTA (Red)	<u>Specimen MUST be kept at 37°C and taken direct to the Transfusion Lab.</u>

## **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 to the haematology department on 0151-252-5490 (internal extension 2490 for Haematology, 2942 for Transfusion). The laboratory will prioritise all URGENT requests.**

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

### **Routine Work**

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

### **Urgent Work**

The turnaround time given under the 'urgent' category is the minimum time needed to analyse a sample if we change the order of work on our work list. 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 one member of the Haematology BMS staff provides cover for all Haematology and Blood Transfusion requests and can be contacted on extension 2490 or bleep 289.

The turnaround times quoted below 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 are 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 eg irradiated products, or there are complicating factors eg 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.	4 hours	1 hour	1 hour
HbS screening test.	4 hours	1 hour	1 hour
ESR	4 hours	75 min	75 min
HbH	8 hours	Not available	Not available
Reticulocytes.	4 hours	1 hour	1 hour
Bone marrow aspirates.	2 days	Discuss with Consultant	Discuss with Consultant
Rheumatoid factor	1 week	Discuss with Laboratory	Not available
Cytochemical stains	By special request	By special request	Not available
Haemoglobin electrophoresis	5 days	Not available	Not available
Quantification of Hb A2, HbS, HbF	5 days	Not available	Not available
G6PD screen/assay	1 day / 1 week	Not available	Not available
PK screen/assay	1 week	Not available	Not available
CyclosporinA	2 days	Discuss with Consultant	Discuss with Consultant
Tacrolimus	Tuesdays + Fridays	Discuss with Consultant	Discuss with Consultant
TdT	1 day	Discuss with Consultant	Discuss with Consultant
Cell markers for leukaemia diagnosis	1 day	Discuss with Consultant	Discuss with Consultant
Lymphocyte subsets	3 day	Discuss with Consultant	Discuss with Consultant
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 Dimers	4 hours	1 hour	1 hour
RICoF ( 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.	1 - 2 weeks	Discuss with laboratory	Discuss with Consultant
Inhibitor screen	4 hours	Discuss with laboratory	Discuss with Consultant
Inhibitor assay	1 - 2 weeks	Discuss with laboratory	Discuss with Consultant
Platelet function test.	By special request	Not available	Not available
Antithrombin III	4 - 6 weeks	Not available	Not available
Anti Xa assay ( LMWH, UHF)	3 hours	1 hour	Discuss with Consultant

Thrombophilia Screen	4 - 6 weeks	Discuss with Consultant	Discuss with Consultant
Anti-Cardiolipin Assay	4 - 6 weeks	Discuss with Consultant	Not available
LUPUS Screen.	4 - 6 weeks	Discuss with Consultant	Not available
vW Multimers	4 - 6 weeks	Discuss with Consultant	Not available
ADAMTS-13	24 hr – Discuss with Consultant	24 hr – Discuss with Consultant Haematologist	Discuss with Consultant
Molecular Studies for Haemophilia	1 month	Discuss with Consultant	Not available
Blood groups	1 day	45 min	45 min
Direct Coombs test	1 day	45 min	45 min
Antibody screens	1 day	45 min	45 min
Antibody panels	1 day	2 hour	2 hour
Compatibility testing and provide cross matched red cells for transfusion	1 day	60 min - if blood type known	60 min - if blood type known
<b>Provide red cells for transfusion in emergency situations when time does not allow cross matching. 2 units of Group O Negative blood are available for emergency use in laboratory issue fridge , theatre fridge AHCH and NICU-LWH</b>		<b>10 min</b>	<b>10 min</b>
Provide Platelets for transfusion	1 day	20 min (if available in trust)	20 min (if available in trust)
Provide Octaplas for transfusion	45 min	20 min	20 min
Provide Cryoprecipitate for transfusion	45 min	20 min	20 min
Kleihauer	1 day	1 hour	1 hour
Cold agglutinins	1 day	Discuss with laboratory	Discuss with Consultant



## 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 month	6 month	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
WCC *10 <sup>9</sup> /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 <sup>9</sup> /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 <sup>12</sup> /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
NEUTs*10 <sup>9</sup> /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 <sup>9</sup> /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 <sup>9</sup> /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
EOS*10 <sup>9</sup> /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	0.0-0.76
BASO*10 <sup>9</sup> /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
MYEL*10 <sup>9</sup> /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)

Ranges compiled from ranges published in Practical Paediatric Haematology by Hinchcliffe and Lilleyman, Blood Cells a Practical Guide by Barbra Bain and Nathan and Oski's Paediatric Haematology.

### Coagulation.

	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

Specific Assays	Clotting Factor	discuss	with	Consultant	Haematologist		
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Special Haematology

	1 day	1 month	1 year	60 year
Serum B12 pmol/L	118 – 716	118 - 716	118 – 716	118 - 716
Serum Folate nmol/L	3.4 – 38.5	3.4 – 38.5	3.4 – 38.5	3.4 – 38.5
Red Cell Folate nmol/L	272 – 1948	272 – 1948	272 – 1948	272 – 1948
Rheumatoid Factor iu/ml	0 – 25	0 – 25	0 – 25	0 – 25
Cyclosporin µg/ml *	91 – 191	91 – 191	91 – 191	91 - 191
Tacrolimus ng/ml **	5 – 20	5 – 20	5 – 20	May-20
Lymphocyte subsets	Discuss	With	Consultant	immunologist

\* Appropriate Cyclosporin results are usually in the range 91 - 191µg/L. However it is the decision of the clinician leading the care of the patient to decide on the therapeutic level to be achieved.

\*\* The therapeutic range of Tacrolimus is not clearly defined but target 12 hour trough whole blood concentrations are 5 – 20 ng/ml early post transplant

Blood Products

This table indicates the typical volumes for each product type

Blood Product	Volume (ml)	Anticoagulant	Haematocrit
Whole Blood (for exchange transfusion only)	468 – 558	CPD	0.45
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 Laboratory	Investigations referred	Turnaround time
Merseyside and Cheshire Regional Genetics lab and Regional Molecular Genetics lab	Liverpool Women's NHS foundation trust Crown street Liverpool. L8 7SS	Routine	Constitutional DNA storage Molecular Genetics Fragile X Cytogenetics	< 2 weeks
Immunology Dept	CLINICAL SCIENCES CENTRE, MANCHESTER ROYAL INFIRMARY, OXFORD ROAD, MANCHESTER, M13 9WL	Specials	Neutrophil oxidative burst  Functional Antibodies	24 hrs  +3 days
North Trent Molecular service	C Floor, Blue wing Sheffield Children's NHS Foundation Trust.  Western Bank  Sheffield S10 2TH	Coagulation	PCR for Haemophilia	8 weeks
Anthony Nolan Trust	Histocompatibility Lab  Fleet Road, Hampstead  London NW3 2QG	Routine	HLA type Family studies	5 days
RLUH Immunology Dept	Immunology Dept.Duncan Building  RLUH and Broadgreen University hospital NHS Trust.	Routine	HLA B27  Auto antibodies  GMB antibodies  Ds DNA antibodies  Natural killer cells  HLA type  ANF  Anti neutrophil antibodies  ENA antibodies  Endomysial Antibodies	5 days

Immunology Dept. Churchill Hospital	The Churchill Hospital Old Road Headington Road Oxford OX3 7LJ	Routine	Muscle specific tyrosine antibodies	14 days
Harefield Hospital	Harefield Hospital Hill End road Harefield Middlesex UB9 6JH	Specials	Sirolimus	24 hrs
Clinical Biochemistry City Hospital Birmingham	City Hospital, Birmingham Dudley Rd, Birmingham B18 7QH	Routine	TMPT 6Mercaptopurine	2 days
Red Cell Lab Kings College Hospital	Red Cell Laboratory Dept of Haematology Kings College Hospital Denmark Hill London SE5 9RS	Specials	G6PD Pyruvate Kinase	10 days
Red Cell Immunohaematology	NBS Liverpool Estuary Banks Speke Liverpool L24 8RB  This will include samples being sent to other NHSBT centres for analysis eg Bristol.  Liverpool NHSBT will use internal transport systems to ensure the sample arrives at the testing lab in a timely manner.	Transfusion	Blood Goup Red Cell phenotype DAT HLA type Investigate TRALI  HLA AB  Xmatch for transplant  Estimate FMH Autoimmune Neutropaenia / Thrombocytopaenia Non haemolytic reaction  Drug related Neutropaenia / thrombocytopaenia  PTP Platelet refractive ness HIT Thrombastaenia Allo antibody investigation	Varied

			Autoimmune haemolytic DAT Haemolytic reactions HDNB Fellys syndrome	
Department of Biochemistry Newcastle Laboratories	Department of Biochemistry Newcastle Laboratories  Newcastle Upon Tyne Hospitals NHS Foundation Trust  Freeman, Royal Victoria and Newcastle General Hospitals	Specials	Sirolimus	1 week
Royal Liverpool and Broadgreen University Hospitals NHS Trust  Coagulation Laboratory	Department of Haematology  Duncan Building  Royal Liverpool and Broadgreen University Hospitals NHS Trust  Prescot Street  Liverpool L7 8XP  0151 706 4967	Coagulation	Protein C  Protein S  APCR  Factor V Leiden  Prothrombin Gene Mutation  LUPUS screen  AT III  Anticardiolipin Antibodies	1-2 weeks
Liverpool School of Tropical Medicine	Diagnostic Laboratory.  Liverpool School of Tropical Medicine  Pembroke Place  Liverpool L3 5QA  0151 708 9393	Routine	Malaria Parasite investigation	1 day
Birmingham Children's Hospital	Haematology  Medical Laboratory Block  Birmingham Children's Hospital  Whittal Street B4 6NH  0121 333 9805	Routine	MRD by Flow	

MOLECULAR GENETICS	CLINICAL SCIENTIST,		COAGULATION MOLECULAR GENETICS FVII,	
ADDENBROOKES TREATMENT CENTRE	MOLECULAR GENETICS,  BOX 158,  LEVEL 6,  ADDENBROOKE'S TREATMENT CENTRE,  CAMBRIDGE UNIVERSITY HOSPITALS NHS FOUNDATION TRUSTS,  HILLS ROAD,  CAMBRIDGE,  CB2 0QQ.	Coagulation	FXIII	
SPECIALIST HAEMOSTASIS,  PATHOLOGY DEP	PATHOLOGY DEPT,  BLOCK 32,  CHANCELLOR'S WING,  ST JAME'S UNIVERSITY HOSPITAL,  BECKETT STREET,  LEEDS,  LS9 7TF.	Coagulation	PLATELET NUCLEOTIDES	
Supraregional Service Molecular Diagnostic lab  Great Ormond Street	Camelia Botnar Labs  Great Ormond Street Children's Hospital London WC1N 3JH	Haematology	HLH Proteins	
Coagulation Laboratory	Royal Hallamshire Hospital, Glossop Road, Sheffield, S10 2JF	Haematology	Factor VIII binding assay, vW Multimers	3 weeks

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### The Laboratory' complaint 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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