

Haematology

Handbook for External Users

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Find us

**Haematology Department
Camelia Botnar Laboratories
Great Ormond Street Hospital
Great Ormond Street
London
WC1N 3JH**

Contact us

Main hospital switchboard		020 7405 9200	
		Telephone	Bleep / direct line
Out of hours service 20:00 - 08:00 Monday to Friday and all weekend and bank holidays			
Haematology and Coagulation		5390	bleep 0596
Blood Transfusion		8527	bleep 0590
Routine working hours			
Laboratories			
Haematology and Coagulation specimen reception		5388	
Haematology Laboratory		5390	
Coagulation Laboratory		5387	
Blood Transfusion Laboratory		8527	direct line 0207 813 8527
Blood Transfusion emergency line (eg. major haemorrhage)		8158	bleep 0590
SIHMDS – Flow Cytometry		7901	direct line 0207 829 7901
SIHMDS – Molecular BMT / Immune Reconstitution		5400	
SIHMDS – Molecular MRD		1481 / 7901	direct line 0207 829 7901

Department of Paediatric Laboratory Medicine
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Senior laboratory staff			
Lead Laboratory Manager	Christine Morris	8664	direct line 0207 829 8664
Haematology and Coagulation Laboratory Manager	Clive Burgess	8409	direct line 0207 813 8409
Blood Transfusion Laboratory Manager	Penny Eyton-Jones	8467	direct line 0207 813 8467
Quality Lead	Kelly Cripps	5515	-
Transfusion Practitioner	Rachel Moss	5396	bleep 0189
SIHMDS Flow Cytometry Lead Healthcare Scientist	Sarah Inglott	7901	direct line 0207 829 7901
SIHMDS Molecular BMT / Immune reconstitution Principal Clinical Scientist	Stuart Adams	7901	direct line 0207 829 7901
SIHMDS Molecular MRD Lead Healthcare Scientist	Gary Wright	5400	
Clinical advice			
Haematology Specialist Registrars - Laboratory		5394 / 0235	bleep 0006 out of hours via switchboard
Haematology Specialist Registrars - Haemophilia		5394 / 0235	bleep 0381 out of hours via switchboard
Divisional Director	Professor Andrew Taylor	8853	-
Haematology Consultants	Dr Ri Liesner Dr Mary Mathias Dr Phil Ancliff Dr Keith Sibson Dr Niharendu Ghara Dr Sujith Samarasinghe Dr Anu Rao Dr Vesna Pavasovic Dr Elsje van Rijswijk Dr David O'Connor	7937 / 6777 7937 / 6777 5361 5392 / 8843 5392 / 8843 8189 8190 7919 6293 -	via switchboard
Haemophilia Centre Reception		8837	out of hours via switchboard
Haemophilia Nurse Consultant	Kate Khair	8130	bleep 0610
Haemophilia Clinical Nurse Specialists		8846 / 7990	bleep 0687
Bone Marrow Transplant Clinical Nurse Specialists		8584 / 0152	bleep 0575

Laboratory Service

Routine Working Hours	
Haematology, Coagulation and Blood Transfusion	
08:00 - 20:00	Monday to Friday
SIHMDS (Flow Cytometry/MRD/BMT)	
09:00 – 17:30	Monday to Friday
Clinical advice	
The laboratory specialist registrars and consultants are contactable for clinical advice from 09:00 – 17:30 Monday to Friday. See table above for contact numbers . At all other times a Specialist Registrar and Consultant are on call and contactable via the switchboard.	

Out of Hours	
Haematology, Coagulation and Blood Transfusion	
20:00 - 08:00	Monday to Friday and all weekend and bank holidays
Clinical advice	
A laboratory Specialist Registrar and Consultant are on call and contactable for clinical advice via the switchboard.	
Tests Available Out of Hours	
The department does not normally process external work out of hours, however for urgent requests please contact the Biomedical Scientist in the first instance. The request may then be referred to the Haematology Laboratory Specialist Registrar on call. Contact us	

Laboratory Advisory Services

Clinical advice

The laboratory Specialist Registrars and Consultants are contactable for [clinical advice](#) including;

- clinical indications and choice of appropriate tests
- advice on individual clinical cases
- professional judgement on the interpretation of the results of examinations

Monday to Friday 09:00 – 17:30. At all other times a Specialist Registrar and Consultant are on call and contactable via the switchboard		
Haematology Specialist Registrars - Laboratory	5394 / 0235	bleep 0006 out of hours via switchboard
Haematology Specialist Registrars - Haemophilia	5394 / 0235	bleep 0381 out of hours via switchboard

Scientific and Technical advice

Biomedical Scientists and Clinical Scientists in the laboratory are available for scientific and technical advice. [Contact us](#)

This User Handbook includes information on the following

- Sample requirements
 - type
 - volume
 - handing requirements
 - specific contraindications for each assay
- limitations of examination procedures
- frequency of requesting the examination

Sample Bottles and Labelling

All samples must be taken and labelled in accordance with Clinical Procedure Guidelines. Please refer to individual tests for specific sample requirements.

- Blood Tests: requesting, labelling and sampling requirements
- Blood Sampling, Neonatal Capillary
- Blood sampling from central venous access devices (CVADs)

Samples must be clearly labelled at the bedside by the person taking the sample, using information from the patient's wristband or photo ID, with surname, forename, hospital number, date of birth, location and date and time of collection.

The name and signature of the person taking the sample should be recorded on the request form.

Pre printed sticky labels can be used for all samples except Blood Transfusion which require a Blood Track generated label or be handwritten. Please place the label on the bottle so that it does not obscure the view of the blood.

In instances where a sample fails to meet laboratory acceptance criteria, the requesting ward or doctor will be contacted and a statement to that effect documented in the report.

Sample Requirements for Haematology and Coagulation

Samples and blood/bone marrow films should be labelled with three points of identification.

Sample Requirements for Blood Transfusion

Samples must be labelled at the patient's side immediately after the sample has been taken, using information from an ID wristband attached to the patient or photo ID.

- **BloodTrack** demand printed label, using the ID badge of the staff member who identified and bled the patient (other sticky labels are not acceptable).
- **Handwritten** with information taken from an ID wristband attached to the patient, photo ID (or consent form if in theatre). Signed by the person who identified and bled the patient.

The Blood Transfusion Laboratory operates a 'zero tolerance' policy. Samples and forms that have been inadequately identified will not be accepted. The referring hospital will be informed.

Request Forms

Please complete an appropriate request form to accompany the sample.

Specific request forms for the following tests can be downloaded from our website:

Glucose-6-phosphate dehydrogenase (G6PD)
Methotrexate,
Blood film/ bone marrow film morphology

<http://www.labs.gosh.nhs.uk/laboratory-services/haematology/send-us-a-sample>

Ensure that the correct patient is identified before proceeding with the request, and that the hospital number is correct.

If tests are being undertaken on a relative (for example mother, father, sibling) they should be allocated a hospital number. Full name and date of birth must be used on forms (not 'mother of'). It is never acceptable to use patient forms / stickers with the name changed.

State the date and time of collection

State the type of sample, and the site (where appropriate).

Identify the consultant and the requester.

Provide a contact bleep / telephone number.

- It is very important to provide correct contact details. This allows the laboratory to respond quickly if there is a problem with the sample or if the test results are unexpected or abnormal.

State the investigations required.

Add any relevant clinical information.

Please discuss request for blood film/ bone marrow film morphology with the Haematology Specialist Registrar covering the laboratory before sending the sample. [Contact us](#)

Sending us a Sample

Please send samples to the following addresses:

<p>Haematology, Coagulation and Blood Transfusion</p> <p>(including slides for the haematology registrars)</p>	<p>Specialist Intergrated Haematological and Molecular Diagnostic Service (SIHMDS)</p> <p>(Flow cytometry, molecular BMT/ immune reconstitution, molecular MRD)</p>
<p>Haematology Department Level1 Camelia Botnar Laboratories Great Ormond Street Hospital Great Ormond Street London WC1N 3JH</p>	<p>SIHMDS Level 2 Camelia Botnar Laboratories Great Ormond Street Hospital Great Ormond Street London WC1N 3JH</p>

Packaging samples

Samples sent by Royal Mail or courier must comply with packaging instruction 650 for UN3373 biological substance, category B.

This is a triple layer system that comprises a primary leak-proof receptacle within a secondary leak-proof receptacle contained in a rigid outer package. The packaging should be strong enough to withstand a 95 kPA pressure differential and a drop of 1.2 m

There should be sufficient absorbent material between the primary and secondary packaging to absorb any spillage. The primary container and absorbent material must be placed into a single bag with the request form in the pouch

The package should be clearly labelled 'diagnostic specimen UN3373'.

Computer Access to Results and Turnaround Times

Results are available from the results portal on our website.

In order to gain access to the results portal, please complete the nQuire application form on the web page.

<http://www.labs.gosh.nhs.uk/laboratory-services/results-portal>

Alternatively, please telephone the laboratory for results.

Grossly abnormal or unexpected abnormal results are automatically telephoned to the requesting ward or doctor.

Please refer to the tables on the following pages for turnaround times for each test.

Biological Reference Intervals

All results displayed in Pathology Results have biological reference intervals related to the age and sex of the patient.

Coagulation biological reference intervals for premature infants are available from the Coagulation Laboratory.

The reference ranges used at Great Ormond Street Hospital are age specific and are provided in the laboratory report.

They are calculated from samples taken from children and adults deemed 'normal' for the parameter being tested. An inclusion and exclusion criteria is used to determine samples to use in calculating the ranges.

For some tests the reference ranges are calculated 'in house' and in others authoritative sources i.e. published books and peer reviewed papers are used.

Where reference ranges are derived from other sources, samples from at least 20 'normal' subjects are tested 'in house' and statistical analysis is used to confirm transference of the ranges are suitable for interpretation of our results.

For detailed information on how each of the reference ranges has been calculated, please contact the Haematology and Coagulation Laboratory Manager.

Repeat Investigations & Specialist Tests

It is not clinically appropriate to repeat the following tests more frequently than stated in the table below. Therefore, before requesting a repeat test, it is advisable to ensure that these have not been performed recently. Thrombophilia screens and other specialist tests are assessed by the scientific and medical staff before analysis.

Assay	Minimum time between tests
Lupus anticoagulant	12 weeks
Anti-cardiolipins	12 weeks
MTHFR mutational analysis	This is a genetic test, repeats will not be processed unless requested by the laboratory
FVL mutational analysis	This is a genetic test, repeats will not be processed unless requested by the laboratory
PR mutational analysis	This is a genetic test, repeats will not be processed unless requested by the laboratory
SIHMDS - other investigations	Discuss with senior laboratory staff

The majority of investigations are carried out on site, however a number are referred to other institutions. If you require a specialist investigation, please discuss this with the Haematology Specialist Registrar and check the tables below for appropriate requirements.

Requesting additional investigations

If additional investigations are required after the specimen has been dispatched or processed by the laboratory, please telephone as soon as possible. There is a practical time limit for requesting additional investigations, as the laboratory stores specimens for variable time periods before disposal. Please note that some specimens deteriorate in storage rendering them unsuitable for further investigation.

Sample retention times

Haematology and Coagulation and Blood Transfusion	
Haematology	1 week
Coagulation	Sample viable for 4 hours. Samples are then retained for 1 week If plasma was stored by prior arrangement, please discuss with the laboratory.
Blood Transfusion	1 week
SIHMDS	
Flow Cytometry	Immunophenotyping – Optimal analysis cut off 72hrs for bone marrow, <3hrs platelet work, <24hrs all other sample types. Samples are then retained for 1 week
Molecular BMT / Immune Reconstitution	1 month
Molecular MRD	1 month

Laboratory Complaints Procedure

The medical and senior management staff in the Department of Paediatric Laboratory Medicine work very closely with users both within the Hospital Trust and with external referring clinicians. In order to provide the best service to its users, the department encourages both positive and negative feedback. Details of the laboratory complaints procedure can be found on the following on our website.

<http://www.gosh.nhs.uk/parents-and-visitors/giving-feedback-and-raising-concerns/make-complaint>

Laboratory Policy on Protection of Personal Information

The laboratory adheres to the Trust's Policy on Information Governance to ensure compliance with the key principles of Information Governance. The Trust wishes to ensure all patients and service users to have confidence that their records will be maintained securely and will not be disclosed or shared inappropriately.

The laboratory has a procedure for the management of data and protection of personal information that is controlled and maintained by the Pathology System Manager and the Data Manager.

These procedures cover:

- Security - data is accessible only to authorised users via a valid and current password.
- Individual user access to functions and facilities - this is restricted to ensure no user has inappropriately high access levels.
- Confidentiality and data protection - the security and access features ensure confidentiality is maintained to authorised and appropriate parties.
- All staff within the laboratory complete mandatory information governance training, are aware of the requirements to maintain confidentiality and the restrictions imposed by the laboratory with regard to information dissemination.

The Trust Data Protection Officer and ICT Department advise the laboratory regarding requirements to comply with current and future legislation for Data Protection.

If you have any further query please [contact the laboratory](#).

Laboratory Tests

Haematology

Coagulation

Blood Transfusion

Specialist Intergrated Haematological and Molecular Diagnostic Service

Flow Cytometry

**Molecular and Immune
Reconstitution**

**Molecular
Minimal Residual Disease**

Laboratory Investigations

Haematology

Test	Sample requirements	Turnaround time	Additional information	Contact the laboratory to arrange the test in advance	External referrals
anti-intrinsic factor antibodies	2ml venous blood, serum gel	14 days		Not required	Samples referred to: Clinical Immunology Department Royal Free Hospital Pond Street NW3 2QG
blood film report	0.5ml venous or capillary blood, EDTA	72 hours	Please state the reason for request.	Not required	External referrals must use the Great Ormond Street blood film request form.
blood film report external referral	blood film or 0.3ml venous or capillary blood, EDTA	72 hours	Unstained films or stained with May-Grünwald / Giemsa. Clearly state the patient's forename, surname, hospital number and date of collection on each slide.	Please discuss with the Haematology Specialist Registrar before sending the sample. Address the package to the Haematology Laboratory, not to the registrar.	External referrals must use the Great Ormond Street blood and bone marrow film request form.
blood parasites	0.5ml venous or capillary blood, EDTA	24 hours	Please state the reason for request, clinical details and country visited.	Not required	
body fluid cell count	1ml body fluid, plain bottle with no anticoagulant	24 hours	Please state the type of body fluid.	Not required	
cell count on cerebrospinal fluid (CSF)	0.5ml CSF, plain bottle with no anticoagulant	8 hours	Must arrive within 4 hours of collection. Samples must be hand delivered to the laboratory. Please send promptly after collection.	Not required	
cytospin	1ml body fluid, plain bottle with no anticoagulant	72 hours		Not required	

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erythropoietin	1ml venous blood / capillary blood, serum gel or lithium heparin	28 days		Not required	Samples referred to: Haematology Department Royal Victoria Hospital Grosvenor Road Belfast BT12 6AB
ESR	0.5ml venous or capillary blood, EDTA	24 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	
ESR and full blood count	0.5ml venous or capillary blood, EDTA	24 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	
Fanconi's anaemia screen	5ml venous or capillary blood, lithium heparin	25 days		Please discuss with the Haematology Specialist Registrar before taking the sample.	All requests must be accompanied by a Fanconi request form, completed and signed by the requesting doctor. Samples referred to: Cytogenetics Department Guy's Hospital Great Maze Pond SE1 9RT
foetal blood haemoglobin HPLC	0.5ml venous or capillary blood, EDTA	7 days		Not required	
full blood count (FBC)	0.5ml venous or capillary blood, EDTA	2 hours (30 minutes for patients on the major haemorrhage protocol)	Must arrive within 6 hours of collection	Not required	
full blood count with film and microscopy report	0.5ml venous or capillary blood, EDTA	72 hours	Must arrive within 6 hours of collection	Not required	
full blood count with reticulocytes and nucleated red blood cells	0.5ml venous or capillary blood, EDTA	2 hours	Must arrive within 6 hours of collection	Not required	

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glucose-6-phosphate dehydrogenase (G6PD)	5ml venous or capillary blood, EDTA or lithium heparin	8 days	Please state the reason for the request. External requests - please send a control sample from a normal caucasian female bled at the same time as the patient.	Please contact the laboratory when sending urgent samples.	External requests must use the Great Ormond Street red cell enzyme request form.
haemoglobin A2 & F levels by HPLC	0.5ml venous or capillary blood, EDTA	10 days	Please state the reason for the request.	Not required	
haemoglobin DNA sequencing	2ml venous or capillary blood, EDTA	70 days		Not required	Samples referred to: Molecular Laboratory Haematology Department Kings College Hospital Denmark Hill SE5 9RS
haemoglobin H bodies	0.5ml venous or capillary blood, EDTA	24 hours	Must arrive within 6 hours of collection. Please state the reason for the request.	Not required	
haemoglobin identification by HPLC	0.5ml venous or capillary blood, EDTA	10 days	Please state the reason for the request.	Not required	Haemoglobin variants are referred for identification to : Red Cell Laboratory Haematology Department Kings College Hospital Denmark Hill SE5 9RS
haemoglobin S level	0.5ml venous or capillary blood, EDTA	10 days		Please contact the laboratory when sending urgent samples.	
haemoglobinopathy screen (FBC, blood film, HPLC)	0.5ml venous or capillary blood, EDTA	10 days	Please state the reason for the request.	Not required	
Heinz bodies	1ml venous or capillary blood, EDTA	48 hours		Not required	

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hexokinase	2ml venous or capillary blood, EDTA or heparin	29 days		Not required	Samples referred to: Red Cell Laboratory Haematology Department Kings College Hospital Denmark Hill SE5 9RS
infectious mononucleosis screen	1ml venous or capillary blood, EDTA	24 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	
intrinsic factor antibodies	1ml, venous blood, serum gel	29 days		Not required	Samples referred to: Clinical Immunology Department Royal Free Hospital NW3 7QG
liver iron	1cm core formalin fixed wedge or needle biopsy	57 days		Not required	Samples referred to: Special Haematology Department Royal Free Hospital Pond Street NW3 2QG
malarial parasite identification	1ml venous or capillary blood, EDTA	48 hours	Please state clinical details and the country where the patient has travelled.	Please inform the laboratory when sending the sample.	
malarial parasites identification of positive samples	none	48 hours for blood film results, 72 hours for PCR results	Positive samples are sent for identification following the initial screen at Great Ormond Street. No additional sample is necessary.	Not required	Samples referred to: (Normal working hours) HPA Malaria Reference Laboratory Department of Infection and Tropical Diseases London School of Hygiene and Tropical Medicine Kepple Street WC2E 7HT (Out of hours) Clinical Parasitology Department 3rd Floor Mortimer Market Centre

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					WC1E 6JB
methotrexate level	1ml venous or capillary blood, EDTA or serum	24 hours	<p>State number of hours post start of methotrexate infusion. Samples must arrive by 14:00 Mon-Fri and by 11:00 at weekends and bank holidays.</p> <p>This assay is unsuitable for patient's who are on glucarpidase rescue treatment. Please contact the laboratory to arrange an alternative assay.</p>	<p>Please contact the laboratory to arrange the test in advance, if sending out of hours or at weekends. Samples must be booked with the laboratory on Friday if required at the weekend or during a bank holidays. External requests must use the Great Ormond Street methotrexate request form.</p> <p>If the patient is on glucarpidase rescue treatment. Please contact the laboratory before taking the sample.</p>	<p>External requests must use the Great Ormond Street methotrexate request form.</p> <p>Sample from patients on glucarpidase rescue treatment sent to: Biochemistry Department University College Hospital 60 Whitfield Street W1T 4EU</p>
nucleated red blood cell count	0.5ml venous or capillary blood, EDTA	2 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	
plasma haemoglobin	1ml venous blood, lithium heparin or EDTA	5 hours	Must be delivered to the Haematology Laboratory immediately.	Please contact the laboratory to before taking the sample.	
pyrimidine-5-nucleotidase	5ml venous or capillary blood, EDTA	Discuss with laboratory		Please contact the laboratory to arrange the test in advance.	Samples referred to: Purine Research Laboratory Guy's Hospital Great Maze Pond SE1 9RT

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pyruvate kinase (PK)	2ml venous or capillary blood, EDTA or lithium heparin	29 days	Please state the reason for the request.	Not required	Samples referred to: Red Cell Laboratory Haematology Department Kings College Hospital Denmark Hill SE5 9RS
red cell enzymes	venous / capillary blood	60 days	Please state the reason for the request. External referrals - please send a control sample from a caucasian female bled at the same time as the patient.	Please contact the laboratory to arrange the test in advance.	External requests must use the Great Ormond Street red cell enzyme request form. Samples referred to: Red Cell Laboratory Haematology Department Kings College Hospital Denmark Hill SE5 9RS
red cell folate	0.5ml venous or capillary blood, EDTA	48 hours	Sample processed for FBC to provide a haematocrit. The sample is then forwarded to the Clinical Biochemistry Department for red cell folate assay.	Not required	External requests must use the Great Ormond Street red cell folate request form.
reticulocyte count	0.5ml venous or capillary blood, EDTA	2 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	
sickle test	0.5ml venous or capillary blood, EDTA	24 hours	If required as a preoperative test, please state the date of the operation.	Please contact the laboratory when sending urgent samples.	
transcobalamin	1ml, venous blood, serum gel	57 days	Sample must be sent to the Haematology Laboratory immediately. Please state the reason for request. Patient must not be on vitamin B12 therapy.	Please contact the laboratory to arrange the test in advance.	Samples referred to: Special Haematology Department Royal Free Hospital Pond Street NW3 2QG
transferrin saturation	2ml venous or capillary blood, lithium lithium heparin or serum gel	6 days		Not required	Samples referred to: Clinical Chemistry Department Charing Cross Hospital Fulham Palace Road W6 8RF
urine haemosiderin	5ml urine, plain bottle with no	72 hours		Not required	

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	anticoagulant				
vacuolated lymphocyte	0.3ml venous or capillary blood, EDTA	72 hours	Please refer to the Histopathology report for results	Not required	

Laboratory Investigations

Coagulation

Test	Sample requirements	Turnaround time	Additional information	Contact the laboratory to arrange the test in advance	External referrals
activated protein C resistance	2.8ml venous blood, citrate	21 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x 1.4ml samples.	Not required	
alpha 2-antiplasmin	1.4ml venous blood, citrate	42 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. Used to investigate rare bleeding disorders or cases of suspected non accidental injury.	Not required	
anti-cardiolipin antibodies	0.5ml venous blood, serum gel	30 days		Not required	
antithrombin antigen	1.4ml venous blood, citrate	30 days		Not required	
antithrombin functional	1.4ml venous blood, citrate	21 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x 1.4ml samples. If the patient is on heparin, please indicate this on the request form.	Please contact the laboratory when sending urgent samples. Samples sent out of hours and at weekends must be arranged in advance with the Haematology Specialist Registrar.	

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anti-Xa assay (low molecular heparin)	1.4ml venous blood, citrate (0.5ml neonatal coagulation bottles are unsuitable for this test)	12 hours	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. 0.5ml neonatal coagulation bottles are unsuitable for this test. Capillary samples are unsuitable for coagulation tests. If the sample is not taken by a peripheral route, it is essential to avoid heparin contamination. Samples must be taken 4-6 hours post last dose of low molecular weight heparin.	Please contact the laboratory when sending urgent samples.	External requests must use the Great Ormond Street anti-Xa (low molecular weight heparin) request form.
anti-Xa assay (unfractionated heparin)	1.4ml venous blood, citrate (0.5ml neonatal coagulation bottles are unsuitable for this test)	12 hours	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. 0.5ml neonatal coagulation bottles are unsuitable for this test. Capillary samples are unsuitable for coagulation tests. If the sample is not taken by a peripheral route, it is essential to avoid heparin contamination.	Please contact the laboratory when sending urgent samples.	External requests must use the Great Ormond Street anti-Xa (unfractionated heparin) request form.
anti-β2-glycoprotein-I	1ml venous blood, serum gel or citrate	90 days	Please state the reason for the request	Not required	Samples referred to: Haemostasis Laboratory Haematology Department University College Hospital 60 Whitfield Street W1T 4EU
coagulation screen	1.4ml venous blood, citrate	3 hours (30 minutes for patients on the major haemorrhage protocol)	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. Screen comprises PT, APTT, thrombin time and fibrinogen. If the patient is on warfarin or heparin, please indicate this on the request form.	Not required	
cytospin	1ml body fluid, plain bottle with no anticoagulant	72 hours		Not required	

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DDAVP response test	2 x 1.4ml venous blood, citrate	31 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
d-dimer	1.4ml venous blood, citrate	6 hours	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. No additional sample is required if performed with a coagulation screen, a single 1.4ml sample is sufficient.	Not required	
factor assays	2 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor assays (APTT based)	2 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. 2.8ml will be sufficient for all tests and a coagulation screen. Factors VIII, IX, XI and XII will be performed.	Not required	
factor assays (PT based)	2 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. 2.8ml will be sufficient for all tests and a coagulation screen. Factors II, V, VII and X will be performed.	Not required	
factor II assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	

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factor II inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor inhibitor assays	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor IX assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor IX inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor IX Inhibitor screen	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor V assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor V inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor VII assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	

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factor VII inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor VIII : vWF antigen ratio	None	30 days	This test is a ratio of factor VIII to vWF antigen. No sample is required for the ratio itself.	Not required	
factor VIII assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor VIII chromogenic	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor VIII inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor VIII Inhibitor screen	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor X assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen. This test is not used to monitor low molecular weight heparin - please refer to anti-Xa assay (low molecular weight heparin).	Not required	

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factor X inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor XI assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor XI inhibitor assay	4.2ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor XII assay	2 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
factor XII inhibitor assay	3 x 1.4ml venous blood, citrate	10 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
factor XIII assay	1.4ml venous blood, citrate	30 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
fibrinogen antigen	1.4ml venous blood, citrate	90 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	

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Fitzgerald factor assay	1.4ml venous blood, citrate	30 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
Fletcher factor assay	1.4ml venous blood, citrate	30 days	Fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with other factor assays, 2.8ml will be sufficient for all tests and a coagulation screen.	Not required	
HIT assay	Please discuss with the Haematology Consultant	Please discuss with the Haematology Consultant	Please discuss with the Haematology Consultant	Please discuss with the Haematology Consultant (Dr Ri Liesner or Dr Mary Mathias).	
HLA type	4.5ml venous blood, EDTA (Blood Transfusion bottle only)	Discuss with Blood Transfusion Laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Not required	Samples referred to: NHSBT Charcot Road Colindale Avenue Colindale NW9 5BG Please contact the Blood Transfusion Laboratory for a request form.
infectious mononucleosis screen	1ml venous or capillary blood, EDTA	24 hours	Must arrive within 6 hours of collection. If performed with an FBC, no additional sample is required	Not required	

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international normalised ratio (INR)	1.4ml venous blood, citrate	3 hours	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If performed with a coagulation screen, no extra sample is required. Screen comprises PT, APTT, thrombin time and fibrinogen. If the patient is on warfarin or heparin, please indicate this on the request form.	Not required	
lupus anticoagulant	2 x 1.4ml venous blood, citrate	17 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x 1.4ml samples. Do not collect a sample if the patient has had a lupus test within the last 12 weeks, as it will be discarded. this is in accordance with national guidelines on lupus testing.	Not required	
plasminogen	1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x 1.4ml samples.	Not required	

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platelet aggregation and platelet nucleotides (diagnostic test)	4 x 5ml venous blood, citrate	24 hours	Fill exactly to the line indicated on the bottle. Samples must be hand delivered to the laboratory immediately. Capillary samples are unsuitable for coagulation tests. 5 ml sample bottles are available form the Haemophilia Centre.	Please discuss with the Haematology Specialist Registrar/ Haemophilia Nurse Consultant before taking the sample.	
platelet aggregation for Berlin Heart drug monitoring	2 x 5ml venous blood, citrate	24 hours	Fill exactly to the line indicated on the bottle. Samples must be hand delivered to the laboratory immediately. Capillary samples are unsuitable for coagulation tests. 5 ml sample bottles are available form the Haemophilia Centre.	Please discuss with the Haematology Specialist Registrar/ Haemophilia Nurse Consultant before taking the sample.	
platelet function analysis	4.8ml, venous blood, citrate (vacutainer only)	24 hours	Vacutainer available from the Haemophilia Centre, or out of hours, by contacting the Haematology Specialist Registrar.	Please discuss with the Haematology Specialist Registrar/ Haemophilia Nurse Consultant before taking the sample.	
platelet nucleotides (content)	4 x 5ml venous blood, citrate	60 days	Fill exactly to the line indicated on the bottle. Samples must be hand delivered to the laboratory immediately. Capillary samples are unsuitable for coagulation tests. 5 ml sample bottles are available form the Haemophilia Centre. If analysed with platelet aggregation, no additional sample is required	Please discuss with the Haematology Specialist Registrar/ Haemophilia centre before taking the sample.	

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platelet nucleotides (release)	4 x 5ml venous blood, citrate	60 days	Fill exactly to the line indicated on the bottle. Samples must be hand delivered to the laboratory immediately. Capillary samples are unsuitable for coagulation tests. 5 ml sample bottles are available from the Haemophilia Centre. If analysed with platelet aggregation, no additional sample is required.	Please discuss with the Haematology Specialist Registrar/ Haemophilia Centre before taking the sample.	
protamine sulphate correction	1.4ml venous blood, citrate	3 hours	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. If analysed with a coagulation screen, no additional sample is required	Not required	
protein C : factor VII ratio		17 days	Only used for patients treated with warfarin.	Not required	
protein C antigen	1.4ml venous blood, citrate	120 days		Not required	
protein C functional	1.4ml venous blood, citrate	21 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x 1.4ml samples. If the patient is on warfarin, please indicate this on the request form.	Not required	
protein S (free)	1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. If the test is required as part of a thrombophilia / procoagulant screen, no additional sample is required. A full thrombophilia screen requires 4 x	Not required	

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			1.4ml samples.		
protein S : factor II ratio	none	30 days	This test is a ratio of protein S to factor II. It is only used when the patient is on warfarin. No sample is required for the ratio itself.	Not required	
protein S : factor X ratio	none	30 days	This test is a ratio of protein S to factor X. It is only used when the patient is on warfarin. No sample is required for the ratio itself.	Not required	
protein S auto antibody	1.4ml venous blood, serum gel or citrate	60 days	For citrate samples, fill exactly to the line on the bottle. Must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Please discuss with the Haematology Consultant (Dr Ri Liesner or Dr Mary Mathias) before taking the sample.	
ReFacto factor VIII assay	1.4ml venous blood, citrate	10 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests. This test should only be requested when the patient is treated with ReFacto AF.	Not required	
reptilase time	1.4ml venous blood, citrate	17 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection. Capillary samples are unsuitable for coagulation tests. Please state the reason for request.	Not required	
thrombin inhibitor	1.4ml venous blood, citrate	17 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection. Capillary samples are unsuitable for coagulation tests.	Not required	
thrombophilia screen	4 x 1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the patient is on heparin, please indicate this on the request form.	Not required	

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vitamin C	2ml venous or capillary blood, lithium heparin	60 days		Please discuss with the Haematology Consultant before taking the sample (Dr Ri Liesner or Dr Mary Mathias).	
vitamin K & PIVKA	2ml venous or capillary blood, serum gel	35days	Please state whether the patient is fasting or non fasting.	Please contact the laboratory to arrange the test in advance.	Samples referred to: Nutristasis Unit Haemophilia Centre St Thomas' Hospital Lambeth Palace Road SE1 7EH
von Willebrand factor activity	1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required A full set of von Willebrand investigations requires 4 x 1.4ml samples. Please state the reason for the request in the clinical details.	Not required	
von Willebrand factor antigen	1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required A full set of von Willebrand investigations requires 4 x 1.4ml samples. Please state the reason for the request in the clinical details.	Not required	

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von Willebrand factor investigations	4 x 1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required A full set of von Willebrand investigations requires 4 x 1.4ml samples. Please state the reason for the request in the clinical details.	Not required	
von Willebrand screen	1.4ml venous blood, citrate	10 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required A full set of von Willebrand investigations requires 4 x 1.4ml samples. Please state the reason for the request in the clinical details.	Not required	
vWF cleaving protease (ADAMTS 13)	2.8ml venous blood, citrate	90 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 2 hours of collection and before 4pm. Capillary samples are unsuitable for coagulation tests.	This test is for research only and is expensive. All requests should be discussed with the Consultant Haematologist (Dr Ri Liesner or Dr Mary Mathias), before taking the sample.	Samples referred to: Haemostasis Research Unit University College Hospital 51 Chenies Mews WC1E 6HX
vWF collagen binding assay	1.4ml venous blood, citrate	30 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required A full set of von Willebrand investigations requires 4 x 1.4ml samples.	Not required	

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vWF multimers	2.8ml venous blood, citrate	90 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required. A full set of von Willebrand investigations requires 4 x 1.4ml samples.	Not required	Samples referred to: Haemophilia Centre and Thrombosis Unit Royal Free Hospital Pond Street NW3 2QG
vWF Normandy	1.4ml venous blood, citrate	90 days	Fill exactly to the line indicated on the bottle. Sample must arrive within 1 hour of collection and before 4pm. Capillary samples are unsuitable for coagulation tests. If the test is required as part of von Willebrand investigations, no additional sample is required. A full set of von Willebrand investigations requires 4 x 1.4ml samples. Please state the reason for the request in the clinical details.	Please discuss with the Haematology Consultant (Dr Ri Liesner or Dr Mary Mathias) before taking the sample.	

Laboratory Investigations

Blood Transfusion

Test	Sample requirements	Turnaround time	Additional information	Contact the laboratory to arrange the test in advance	External referrals
anti-HLA antibodies	4.5ml venous blood, serum gel	Discuss with Blood Transfusion Laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Not required	Samples referred to: National Blood Service Colindale Centre Colindale Avenue Colindale NW9 5BG Please contact the Blood Transfusion Laboratory for a request form.

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anti-platelet antibodies (refractoriness)	4.5ml venous blood, EDTA (Blood Transfusion bottle only) & 4.5ml serum gel	Discuss with Blood Transfusion Laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Not required	Samples referred to: National Blood Service Colindale Centre Colindale Avenue Colindale NW9 5BG Please contact the Blood Transfusion Laboratory for a request form.
blood group and antibody screen	2ml venous blood, EDTA (Blood Transfusion bottle only)	Up to 48 hours	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Please contact the laboratory if the sample is urgent.	
crossmatch (including blood group and antibody screen)	2ml venous blood, EDTA (Blood Transfusion bottle only)	Up to 24 hours	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please state the volume of blood required in millilitres, the time and date when blood is required and the specific reason for transfusion. Inform the laboratory of any transfusion special requirements and send a special requirements form to the Blood Transfusion Laboratory.	Patient with special transfusion requirements must have a Blood Transfusion special requirements form completed and a copy faxed to the Blood Transfusion Laboratory.	
direct antiglobulin test	1ml venous blood, EDTA (Blood Transfusion bottle only)	Up to 24 hours	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed. A valid group and save sample may be used for this test.	Not required	

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HLA type	4.5ml venous blood, EDTA (Blood Transfusion bottle only)	Discuss with Blood Transfusion Laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Not required	Samples referred to: NHSBT Charcot Road Colindale Avenue Colindale NW9 5BG Please contact the Blood Transfusion Laboratory for a request form.
isohaemagglutinin titres	2ml venous blood, EDTA (Blood Transfusion bottle only)	Up to 7 days	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Please contact the laboratory when sending urgent samples.	External referrals should use the Great Ormond Street isohaemagglutinin request form.
neonatal alloimmune thrombocytopenia	4.5ml venous blood, EDTA (Blood Transfusion bottle only)	Discuss with laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed.	Not required	Samples referred to: NHSBT Bristol Centre 500 North Bristol Park Northway Filton Bristol BS34 7QH Please contact the Blood Transfusion Laboratory for a request form.
red cell antibody identification	2ml venous blood, EDTA (Blood Transfusion bottle only)	Up to 48 hours	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who bled the patient.	Not required	Samples referred to: NHSBT Charcot Road Colindale Avenue Colindale NW9 5BG
red cell phenotype	1ml venous blood, EDTA (Blood Transfusion bottle only)	Discuss with Blood Transfusion Laboratory	Blood Transfusion samples must be labelled using BloodTrack generated label or handwritten and signed by the person who identified and bled the patient. Please discuss sample volumes with the Blood Transfusion	Not required	

			Laboratory as it may be possible to use a smaller amount for neonates and children who are difficult to bleed. A valid group and save sample may be used for this test.		
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Laboratory Investigations

Specialist Intergrated Haematological and Molecular Diagnostic Service

SIHMDS samples: discuss with laboratory as volume required is influenced by total cell count specifically immunophenotyping, MRD and engraftment analysis

Flow Cytometry

Test	Sample requirements	Turnaround time	Additional information	Contact the laboratory to arrange the test in advance	External referrals
Anti-neutrophil antibodies	1.4ml venous blood, Serum	60 days		Not required	Samplers referred to Histocompatibility and Immunogenetics Bristol IBGRL
B-cell maturation panel	ACD-A 9ml bottle, of BM aspirate	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
Bone marrow/blood characterisation (haematological)	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	

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bone marrow film report	bone marrow film or 0.3ml bone marrow, EDTA	7 days	Clearly record the patient's surname, forename, hospital number and date of collection on each slide.	Not required	External referrals must use the Great Ormond Street blood film request form
CD66abce expression on leukaemic cells	ACD-A 9 ml bottle, Venous or BM aspirate	4 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
CD52 expression on leukaemic cells	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping /Molecular MRD requests	Contact ext 1481	
CD22expression on leukaemic cells	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping/Molecular MRD requests	Contact ext 1481	
EMA binding (HS)	EDTA Venous Small volume required 200uls	7 days	EMA can be performed on FBC sample	Contact ext 1481	
Erythroid Immunophenotyping	ACD-A 9ml bottle, Venous or BM aspirate	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	

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Flow MRD ALL	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping /Molecular MRD requests	Not required	
Flow MRD AML	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping/Molecular MRD requests	Not required	
Flow MRD post BMT	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping /Molecular MRD requests	Not required	
Intra cellular markers (MPO, cCD79a, cCD3)	ACD-A 9ml bottle, Venous or BM aspirate	4 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
iron stain	bone marrow slide	10 days		Not required	

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Lymphoid immunophenotyping	ACD-A 9ml bottle, Venous or BM aspirate Tissue Biopsy (discuss with lab) CSF, Pleural Fluid, Perrineal Fluid, Other Fluid – Put into sterile universal	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests Optimally same day analysis is required	Contact ext 1481	
Lymphoma immunophenotyping	ACD-A 9ml bottle, Venous or BM aspirate Tissue Biopsy (discuss with Lab)	3days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests Discuss with lab size of sample required	Contact ext 1481	
MLL associated NG2 expression on leukaemia cells	ACD-A 9ml bottle, Venous or BM aspirate	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
Myelodysplastic/myeloproliferative disorders (diagnostic)	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
Myelodysplastic/myeloproliferative disorders (Follow Up)	ACD-A 9ml bottle, Venous or BM aspirate Note: Pancytopenic patient may require larger volume	5 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	

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Myeloid immunophenotyping	ACD-A 9ml bottle, Venous or BM aspirate	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	
Neuroblastoma solid tumour markers (diagnostic)	ACD-A 9ml bottle, Venous or BM aspirate Tissue Biopsy (discuss with Lab)	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests Discuss with lab size of sample required	Contact ext 1481	
Neuroblastoma Solid Tumour Markers (Follow Up)	ACD-A 9ml bottle, Venous or BM aspirate Tissue Biopsy (discuss with Lab)	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests Discuss with lab size of sample required	Contact ext 1481	
Platelet Activation (functional analysis for PAC-1 and P-selectin)	1.4ml Venous, Sodium Citrate	48hrs	Sample must be taken without trauma and be delivered by hand immediately to the lab	Contact ext 1481	
Platelet Antibodies Direct Please note: Indirect anti-platelet antibodies are sent to Blood Transfusion and are labelled in accordance with their sample acceptance policy	EDTA, Venous Volume dependent on platelet Count. Discuss with Lab	48hrs	Sample to arrive in Lab by midday	Contact ext 1481	
Platelet glycoproteins	1.4ml EDTA, Venous	24hrs	To arrive in lab <3hrs post sampling Hand deliver (do not put in chute system)	Contact ext 1481	

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PNH	1.4ml EDTA, Venous	4 days		Contact ext 1481	
red cell membrane analysis	2-5ml venous or capillary blood, EDTA	29 days	Samples must arrive within 1 hour of collection. Include a normal control sample collected at the same time and treated in the same way as the patient's sample. Please send a covering letter, signed by the requesting doctor, detailing the patient's medical history.	Please contact the laboratory to arrange the test in advance.	Samples referred to: International Blood Group Reference Laboratory NHSBT North Bristol Park Filton Bristol BS10 5ND
T-cell phenotyping	ACD-A 9ml bottle, of BM aspirate	3 days	This analysis can be performed on an ACD-A sample that has been sent for other immunophenotyping requests	Contact ext 1481	

Molecular and Immune Reconstitution

Test	Sample requirements	Turnaround time	Additional information	Contact the laboratory to arrange the test in advance	External referrals
ADA Mutation	1ml venous or capillary blood, EDTA	48 hours		Not required	
BMT engraftment studies	1ml venous or capillary blood, EDTA	Up to 48 hours	Please note that there is also a separate test for cell lineage chimerism analysis (listed in this table)	Not required	
Cell lineage chimerism analysis	5ml venous or capillary blood, EDTA	Up to 48 hours	Volume of blood required can vary depending on patient cell counts. Please contact lab on 7901 for advice	Not required	
Cell fractionation	5ml venous or capillary blood, EDTA	Up to 48 hours	Volume of blood required can vary depending on patient cell counts. Please contact lab on 7901 for advice	Not required	

Spectratyping	5ml venous or capillary blood, EDTA	Up to 48 hours	Sample volume required will vary according to patient cell counts. Please contact lab on 7901 for advice. Also, if requesting this test alongside the TRECS test, a total of 5ml is sufficient for both tests	Not required	
TRECS analysis	5ml venous or capillary blood, EDTA	Up to 48 hours	Sample volume required will vary according to patient cell counts. Please contact lab on 7901 for advice. Also, if requesting this test alongside the Spectratyping test, a total of 5ml is sufficient for both tests	Not required	

Molecular Minimal Residual Disease (molecularMRD) - including UKALL 2011 Trial

1 Criteria for Accepting or Rejecting Samples

- All recommendations in this Handbook, for molecularMRD analysis of ALL samples, are taken from the UKALL 2011 Protocol for UKMRD Network. Internal users can find this on Q-Pulse as document FEX 608. External users may e-mail ukall.mrd@gosh.nhs.uk
- If a sample does not fit any of the scenarios outlined in the six paragraphs below, the next course of action shall be discussed with a Haematology Consultant.

2 Preparation of Patient

- No special requirements.

3 Consent

- Informed Consent, if given, by patient/ guardian is managed by the clinical team and signed evidence is sent to the GOSH Data Management Team. Data
- Management Team informs laboratory staff via e-mail when any patient consents to UKALL 2011 Trial.
- MolecularMRD samples are tested in exactly the same manner whether the patient is on Trial or not.
- For GOSH patients who consent to the Trial, laboratory staff send some patient cells to the UK Biocentre at Stockport, UK and forward anonymised patient results to CRCTU (Cancer Research UK Clinical Trials Unit).

3 Request Form

- All requests for molecularMRD analysis should be on a UKALL 2011 MRD Request Form, whether the patient/ guardian has consented to the Trial or not. If the patient has consented to Trial, or for new diagnosis patients please also complete and send a Cell Band sample information sheet. Please fill in all blank fields on forms.
- These forms are available to internal users as documents FEX 605 and FEX 606 on Q-Pulse and to external users by e-mailing ukall.mrd@gosh.nhs.uk.
- Due to cultural differences with regard to patient registration, patients from Kuwait may present with changing patient identifiers (names and DOB) at each hospital visit. In many such cases the only consistent unique identifier is the Kuwait Hospital (NBK) Number. *As agreed by Dr. Phillip Ancliff, for Kuwait samples ONLY the NBK number may be accepted as a single unique identifier, instead of the usual three unique identifiers. This is relevant only for samples sent directly to the laboratory as patients attending GOSH in person will have many identifiers – passport, Civil ID etc. and will be registered by International Private Patients (IPP) staff.*

4 Suitable Sample Type and Anticoagulant

Sample Type	Minimum Amount
Bone Marrow Aspirate	Diagnosis: 10 x10 ⁶ mononuclear cells
	All other timepoints: 5x10 ⁶ mononuclear cells
Peripheral Blood – is only acceptable if the sample is a diagnostic sample from a patient who cannot provide a bone marrow aspirate. Peripheral blood can only be used if the blast count is >20%. Peripheral blood will not be accepted for relapse samples or for any other timepoints.	Diagnosis: 10 x10 ⁶ mononuclear cells
	All other timepoints: 5 x10 ⁶ mononuclear cells
Bone Marrow Trepine – UNFIXED Trepine (in saline-soaked gauze) is only acceptable for diagnostic ALL samples with cell-poor, or no, accompanying bone marrow aspirate.	<ul style="list-style-type: none"> • In such cases laboratory staff will take the trephine immediately to Histology staff on Camelia Botnar Laboratory Level 3 and allow them assess quality of trephine. If possible the sample will be divided into a piece for histological embedding and a piece for molecularMRD DNA extraction. • If the sample is inadequate for both histology and molecularMRD, allow a Haematology or Histology Consultant decide which information will be of most use and process the sample accordingly. • If trephine is received in saline for a condition other than ALL, or with an accompanying aspirate sample that has adequate cell count for both immunophenotyping and molecularMRD – laboratory staff will take the sample without delay to Histology staff on Camelia Botnar Laboratories Level 3 to add formalin to the trephine before the tissue deteriorates further.

Bone Marrow Aspirate Slides	<ul style="list-style-type: none"> • FIXED or UNFIXED slides are only accepted when no other diagnostic material is available and only after discussion with laboratory staff or Haematology Consultant. 	
Anticoagulant		
<ul style="list-style-type: none"> • Bone marrow aspirate or peripheral blood samples should be taken in ACD tubes. • EDTA may be used only if ACD is unavailable. MolecularMRD analysis using UKALL 2011 protocol has been validated for use with ACD samples but not with EDTA samples. • Requests for molecularMRD analysis of EDTA samples is at the discretion of the requesting Consultant and interpretation of that result must be made with this in mind. • Bone marrow aspirate or peripheral blood samples should be taken in ACD tubes. • EDTA may be used only if ACD is unavailable. MolecularMRD analysis using UKALL 2011 protocol has been validated for use with ACD samples but not with EDTA samples. • Request for molecularMRD analysis of EDTA samples is at the discretion of the requesting Consultant and interpretation of that result must be made with this in mind. 		
5 Transportation of Samples		
Temperature	<ul style="list-style-type: none"> • Transport to the laboratory at room temperature. Samples are not to be refrigerated overnight or for longer periods as this will negatively affect mononuclear cell isolation 	
Timing	<ul style="list-style-type: none"> • For optimum results, sample processing must begin as soon as possible and no later than 6 hours post collection. Samples received outside of this timeframe will still be tested but interpretation of that result must be made with this in mind and is the responsibility of the clinician. Date and time sample received is printed on each report. 	
Delivery route	<ul style="list-style-type: none"> • GOSH samples may be delivered to the laboratory (CBL Level2 P2.013) directly from theatre/ ward by any GOSH staff member, between 09:00 and 17:15, Mon-Fri. Outside these times the sample must be delivered to the Haematology Scientist On-Duty (CBL Level1 P1.012). • External samples are sent to the laboratory via Mail or Courier and received by Blood Sciences Reception (CBL Level1 P1.012). Such packages will normally be addressed to Gary Wright, Camelia Botnar Laboratories, Great Ormond Street Hospital, WC1N 3JH. Patients/ guardians are never required to deliver such samples personally to the laboratory. 	
6 Suitable Timepoints and Listed Turnaround Times for molecularMRD Analysis		
Patient	Timepoint	Turnaround Time

Department of Paediatric Laboratory Medicine
Haematology Handbook for External Users

Every 1st diagnosis ALL patient	Diagnosis	29 Days
	Day 29	5 Days
Patients who were molecularMRD risk at day29	Week 9 (only if consented to UKALL 2011)	5 Days
	Week 15	5 Days
Every relapse ALL patient	Diagnosis	35 days
	Day 35	5 days
	Week 13	5 days
<p>Any Other Timepoint** For any other timepoint samples, molecularMRD analysis will only be performed if the laboratory staff is advised by e-mail at ukall.mrd@gosh.nhs.uk or at the weekly MDT meeting. For long-term follow-up samples with a structured testing schedule such as post-BMT patients or Clinical Trial participants you need only inform the laboratory staff of the testing schedule in advance of the first sample.</p>		5 days
7 Time frame for Storage of Sample and Documents Post Analysis		
Samples	2 months	
Paperwork	indefinite	
8 External Quality Assurance (EQA)		
<p>The molecularMRD laboratory at GOSH is a member of the UKALL molecularMRD Virtual Laboratory Network and of the international group Euro-MRD, a branch of ESHLO. We participate in two EQA exercises per year, both run by Euro-MRD/ ESHLO. Our membership status can be seen on ESHLO.eu. Our EQA performance can be seen by internal users on Q:Drive xxxxx and by external users by e-mailing ukall.mrd@gosh.nhs.uk</p>		

Key factors affecting tests

- If sampling from a central venous catheter, sufficient waste should be removed to prevent contamination of the sample with heparin and also to prevent dilution of the sample. Do not use the waste for the Blood Transfusion sample.
- Do not take the sample from an arm with a drip.
- Ensure the liquid anticoagulant is shaken to the bottom of the bottle before removing the lid.
- Do not delay between taking the blood and placing it in the sample bottle.
- As soon as the sample is placed in the bottle, mix thoroughly by gentle inversion. Do not shake.
- Do not tip blood from one bottle to another, as this may contaminate the sample with an inappropriate anticoagulant.
- Samples should be transported to the laboratory to arrive within the time limits stated.
- Coagulation samples must be filled exactly to the level indicated on the bottle. Overfilled and underfilled samples are unsuitable for analysis.
- If the patient is on anticoagulants, please state this clearly on the request form. Neonatal collection bottles cannot be used to monitor heparin.
- Capillary samples are unsuitable for coagulation tests.
- Patients with a haematocrit below 0.2 or above 0.55 may require a special coagulation bottle containing an adjusted volume of anticoagulant. Please discuss with the coagulation laboratory before taking the sample.
- Heparin contaminated samples are unsuitable for coagulation tests.
- Anticoagulated samples which have clotted are unsuitable for analysis.
- Haemolysed samples are unsuitable for analysis.
- FBC samples >24 hours old are unsuitable for analysis.
- ESR samples >6 hours old are unsuitable for analysis.
- CSF samples >6 hours old are unsuitable for analysis.
- Coagulation samples > 4 hours old are unsuitable for analysis, however plasma may be frozen by prior arrangement, please discuss with the laboratory.
- Blood transfusion samples >24 hours old are unsuitable for analysis.

Useful links

Clinical guidelines are available on the hospital website

Blood Tests: requesting, labelling and sampling requirements

Blood Sampling, Neonatal Capillary

Blood sampling from central venous access devices (CVADs)