

Haematology Laboratory User Guide

The laboratory is a UKAS accredited medical
laboratory No 8835

Date of Issue: November 2024
Review Date: November 2025
Author: M Naidoo

Version 9.5

CONTENTS	Page
1. General Information	4
Introduction	4
Location of laboratories	4
2. Opening hours.....	5
Out of hour's service for URGENT tests	7
Haematology out of hours test list.....	7
3. Information regarding laboratory tests	8
Clinical advice.....	8
4. Key Personnel	8
5. Haematology - Principal Services.....	10
Clinical and Diagnostic Service	10
Consultative Services	10
Analytical Services.....	10
Teaching.....	11
Research and Development	11
Continuous improvement.....	11
Document control.....	11
6. Quality & Accreditation	12
7. Patient Confidentiality/ Personal info.....	12
8. Compliments, Complaints & Concerns procedure	12
9. Requirements for request forms (CERNER MILLENIUM, ICE, MEDITECH and Handwritten forms).....	13
WUTH wards and departments	13
CCC wards and departments	14
General practitioners	14
10. Labelling requirements for specimens	14
Handling Hazardous Specimens	15
11. Sample Availability	15
Add on requests section	15
Standard procedures for the safe collection of specimens	16

12. Haematology Blood Collection Charts.....	17
13. Transport of clinical specimens to the Laboratory	20
Packaging and transport.....	20
Specimens collected from Arrowe Park Hospital	20
Specimens collected from Community and GP Practices.....	21
14. Haematology Tests and Turnaround Times.....	21
15. Referred Out Samples	27
Specialist Referral Tests.....	27
16. Key factors which affect the performance and or result of a haematology Test	27
17. Criteria for rejection of pathology samples	28
18. Haematology reference intervals.....	29
19. Coagulation reference intervals.....	33
Paediatric coagulation reference intervals	34
20. Uncertainty of measurement.....	35
21. Unexpectedly abnormal results	35
22. Directory of Addresses for Reference Laboratories	36

1. General Information

Introduction

Welcome to the Haematology Department User Manual of Wirral University Teaching Hospital NHS Foundation Trust (WUTH). The Haematology Department provides a wide range of consultative, analytical, teaching, and developmental services. The department provides its services from 2 sites. The main department is located at Arrowse Park Hospital with a satellite essential services laboratory located at Clatterbridge Cancer Centre (CCC) which is located on the Clatterbridge site.

This user manual is designed to give an overview of services available in the Department including the availability of clinical advice as well as the scope and limitations of the service. It is intended as a quick reference guide for all users, both within WUTH and primary and other secondary care health providers who use the service. Results of laboratory tests are made available to patients through their Clinicians or General Practitioners.

The Haematology Department is accredited by UKAS (United Kingdom Accreditation System) and has ISO 15189 accreditation. In addition, the Transfusion service is regulated by Medicines and Healthcare Regulatory Authority (MHRA). The service undergoes continuous review through quality assurance and audit activities

A controlled electronic copy of this manual is available to all clinical areas and general practitioners within WUTH catchment area via the WUTH website:

<http://www.wuth.nhs.uk>

For laboratory staff additional copies of this document are accessible via QPulse (Document management system) and a paper copy is stored in the Quality station in Blood Sciences laboratory

Location of laboratories

At Arrowse Park Hospital the Haematology Laboratory is located on the ground floor. From the main entrance continue to end of corridor passing main hospital lifts and turn right. The laboratory is situated at the far end of this corridor.

At the Clatterbridge Cancer Centre, the satellite Haematology laboratory is located on the first floor next to Delamere ward and is accessed by ascending the main stairs just off the main entrance to the Clatterbridge Cancer Centre, signposted Pathology Laboratory. Refer to QM-DM-002, CCC user guide.

2. Opening hours

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

SECTION	CORE HOURS	CONTACT NUMBER
Specimen Reception	24/7 service for receipt of samples	0151 678 5111 ext. 2104 DDI 0151 604 7093
Haematology (APH)	Mon-Fri 09:00 – 17.30 (Except bank holidays) Reduced test repertoire at all other times	0151 678 5111 ext. 2093 Bleep 2093 (after core hours)
Phlebotomy (APH)	<u>Ward service:</u> Mon-Fri 07:30 -14:30 Weekends and Bank Holidays: 07:30 – 11:30 <u>Main OPD clinics:</u> Monday to Thursday 08:30-17:30 Friday 08:30 – 17:00	0151 678 5111 ext. 8425 (Office) DDI151 604 7382
Transfusion	Mon-Fri 09:00 – 17.30 (Except bank holidays) Reduced test repertoire at all other times	0151 678 5111 ext. 2100 Fax 0151 604 0034 / Internal fax 8465 Bleep 2093 (after core hours)
Transfusion Practitioner	Mon-Fri 09:00 – 17.30 (Except bank holidays)	0151 678 5111 Bleep 2276

SECTION	CORE HOURS	CONTACT NUMBER
Phlebotomy (CGH)	<p><u>Ward service:</u> Mon-Fri 08:00-09:00 No Bank holiday or weekend service.</p> <p><u>OPD clinic:</u> Main Outpatients Department clinics run Monday to Thursday from 09:00 to 17:30hrs and on a Friday from 09:00hrs to 17:00hrs.</p> <p>There is an appointment led Phlebotomy clinic in the Diagnostic Centre held on the grounds of Clatterbridge Cancer Centre. This is operational 09:00hrs to 16:20hrs Monday to Friday.</p>	<p>0151 678 5111 ext. 8425 (Office)</p> <p>0151 678 5111 ext. 5140</p>
Haematology (CCC)	<p>Mon-Fri 09:00 – 17.00</p> <p>Bank Holidays 08:30 – 16:30 or at the managers discretion</p>	0151 334 4000 ext. 565943

For further information on service for Clatterbridge Cancer Centre please see the CCC user guide QM-DM-002

Out of hour's service for URGENT tests

At least one Biomedical Scientist is available to provide the Haematology and Blood Transfusion service throughout this period. All requests received during this period will be prioritised and processed dependent on current workload.

All requests made during out of hours should be requested on HIS (hospital information system) with an urgent priority. If a request form is used, the form should be marked URGENT and a contact telephone number where the result can be telephoned to must be provided.

The BMS must be contacted (via bleep system) if:

- Request is for blood or blood products/components
- Request is very urgent
- Request for malarial parasite screening
- Urgent ESR
- Pre-operative sickle screen
- Non-core test (see list of out of hours tests below)

Haematology out of hours test list

For any other tests the on-call consultant haematologist must be contacted

Transfusion	Group & Antibody Screen
	Blood and blood product issue
	Group and Coombs
	Transfusion Reaction Investigation
	Keilhauer (weekend service & Bank holiday 9am-12pm only)
Haematology	FBC
	Coagulation Screen
	INR
	APTT
	D-Dimer
	Urgent factor assays for treatment
	Malaria Screen
	ESR if: Suspected Temporal Arthritis Polymyalgia rheumatica Differential diagnosis of hip pain in children
	Sickle screen – Patients going for emergency theatre only.

3. Information regarding laboratory tests

Information regarding laboratory tests can be obtained by accessing laboratory tests online:

<http://www.labtestsonline.org.uk/>

Or by contacting the department directly: **0151 678 5111 ext. 2093**

Address for all correspondence:

Haematology Laboratory
Arrowe Park Hospital
Arrowe Park Road
Upton
Wirral
CH49 5PE

Hospital switchboard telephone number: 0151 678 5111

Web address: <http://www.wuth.nhs.uk>

Clinical advice

Clinical advice is always available including advice on individual cases.

To contact a consultant haematologist during core hours, 9am – 5.30pm Monday – Friday, contact the Consultant Haematologists' secretary. The individual telephone numbers are contained in **section 4**, Key contacts, and their telephone numbers.

To Contact the Consultant Haematologist during non-core hours, telephone Arrowe Park switchboard and ask to speak to the Haematologist on call.

4. Key Personnel

Members of staff are available on extension numbers during normal working hours via the Arrowe Park Hospital Switchboard, telephone number 0151 678 5111

Position	Staff member	Internal extension / DDI	e-mail
Divisional Director	Mr Paul McNulty	2661	paul.mcnulty@nhs.net
Clinical Service Lead	Dr Lynn Rowbottom	2086	lynn.rowbottom@nhs.net
Pathology Manager	Mr Alex Warrington	7216	alex.warrington@nhs.net

Position	Staff member	Internal extension/ DDI	e-mail
Blood Sciences Operational Manager	James Sullivan	8280	james.sullivan12@nhs.net
Quality	Joanne Evans	7793	joanneevans1@nhs.net
Haematology Manager	Malinie Naidoo	8280	M.Naidoo@nhs.net
Transfusion Manager	Steven Carter	2100	stevencarter@nhs.net
Transfusion Practitioner	Vacant		
Consultant Haematologist Secretary	Dr B Hammer Helen Evans	2821 DDI 0151 604 7105 2105	barbarahammer@nhs.net
Consultant Haematologist Secretary	Dr E Jones Anne Whitehead	2089 DDI 0151 604 7122 2658	elizabethjones5@nhs.net
Consultant Haematologist Secretary	Dr R Dasgupta Hazel Edwards	8069 DDI 0151 604 7679 8456	rdasgupta@nhs.net
Diagnosics & Clinical Support Associate Medical Director	Dr Simon Lea Secretary Jill Dunn/ Carol Cottrell	2982 2656	simon.lea@nhs.net wih- tr.DiagnosticsClinicalSupport Secs@nhs.net
Pre-Analytics Manager	Sue Lee	2032	susan.lee21@nhs.net
Clinical Biochemistry Manager	Dawn Herbert	8280	dawnherbert@nhs.net
Results Enquiries		2104	

5. Haematology - Principal Services

Clinical and Diagnostic Service

The principal diagnostic laboratory is based at Arrowe Park Hospital. In addition, there is a small essential services satellite laboratory on the Clatterbridge site within the Clatterbridge Cancer Centre building. Access to consultative and principal diagnostic services are available on a 24-hour basis. Advice on the selection of appropriate diagnostic specimens, their collection and transport are also available.

Results of clinical significance are phoned through to the surgery, ward, or relevant medical staff, irrespective of whether the original request is marked as urgent or routine.

The department offers a wide range of consultative, analytical, teaching, and developmental services. The department has a document control management system (QPulse) and undertakes regular audit to demonstrate continuous improvement.

Consultative Services

Consultant haematologists are available for advice regarding clinical or laboratory issues during office hours and provide an emergency only service out of hours via the switchboard at Arrowe Park Hospital.

Significantly abnormal results are reviewed by a consultant haematologist and results communicated to clinical staff to ensure rapid access for haematological opinion.

In addition, Arrowe Park Hospital has a 7-day consultant-led clinical haematology unit for effectively managing both in- and out-patient haemato-oncology patients. Consultant Haematologists also deliver general haematology clinics. Pharmacist – led anticoagulant clinics are delivered in an out-patient setting 3 days a week.

As well as general haematology interests, the Consultant Haematologists also take a pro-active lead in the specialist areas of transfusion, anticoagulation, thalassaemia and haemoglobinopathy investigations and cancer.

Analytical Services

In addition to routine haematology, coagulation and transfusion laboratory services, the department also offers a range of haematological molecular genetic tests. The department is fully automated to ensure it delivers a timely service to support patient care. In addition to its routine service, it provides an out of hour's service delivering rapid turnaround of out of hours tests for primary and secondary care.

All test results are validated by a full programme of both internal and external quality assurance procedures. The Haematology department participates in external quality assurance and proficiency schemes from the UK (UKNEQAS).

Teaching

The department is an IBMS approved training laboratory for pre-registration Biomedical Scientists and specialist training in Haematology with Hospital Transfusion Practice.

It supports the training of undergraduate and postgraduate medical students and undergraduate BMS students and has developed close links with the local universities. All training in the department is supported by the departmental training co-coordinator.

Research and Development

The department has an active research and development programme in several areas, especially molecular genetics.

The clinical haematology unit is actively involved in clinical trials and is supported in this role by a specialist haematology research nurse.

The Transfusion Practitioner supports transfusion development and patient safety issues.

All medical and technical staff participate in CPD. Technical staff are required to maintain a professional portfolio.

Our readily accessible clinical and laboratory staff are glad to answer any questions and offer advice.

Continuous improvement

To ensure a process of continuous improvement, the department has an internal audit schedule which examines all areas of department performance. The department also participates in national audits to bench mark its performance and ensure best practice compliance. The audit programme is supported by the departmental quality lead.

Document control

All documents used in Haematology are managed electronically using Q-Pulse software (Q-Pulse; Gael Quality Limited).

Documents are embedded within the system and backed up on Trust IT servers to protect their integrity.

There are policies, procedures, and templates specific to Haematology as well as shared directorate documents.

The department and Directorate of Laboratory Medicine are obliged to follow Trust policy and procedures. To avoid duplication some of these policy and procedure documents are used in place of departmental ones. Trust policies and procedures are located on the intranet.

6. Quality & Accreditation

Quality Control: All tests carried out within the laboratory are subject to regular internal quality control mechanisms. If Internal QC results do not meet the required acceptance criteria, routine analysis will not proceed until appropriate corrective action has been undertaken & satisfactory performance is demonstrated.

Quality Assurance: The Directorate participates in External Quality Assurance Programmes. The performance of these programs is managed and reported by independent bodies. Failure to maintain appropriate standards can result in intervention from an expert panel. However, any performance issues are raised internally and are subject to corrective action following the non-conformance handling procedure.

Data Availability: All data from Quality Control and Quality Assurance programs is held within the laboratory. Should any user wish to examine any of this data then this can be facilitated. Any request for control data associated with any individual test can also be identified and reported.

Accreditation: The Haematology department currently holds accreditation status with United Kingdom National Accreditation (UKAS) to ISO 15189. For a full list of accredited tests see the UKAS website. Accreditation Number: 8835

7. Patient Confidentiality/ Personal info

Wirral Hospitals adopts the NHS Information Governance framework to ensure patient, staff and other confidential information is handled securely and safely. The Wirral Hospitals Information Governance policy (ref 095) relates to all information used by the Trust and its employees and to other NHS policies and legislation. Through its mandatory staff induction programme, it ensures staff are made aware and follow procedures documented in this policy and subsequently annual mandatory assessments are required to allow the trust to monitor its compliance.

Consent – It is assumed by the laboratory that by sending specimens for analyses the requester has received consent from the patients.

Clinicians should be aware that the laboratory may reflex tests where clinically indicated or to aid in interpretation.

8. Compliments, Complaints & Concerns procedure

Users wishing to raise a concern, make a complaint or compliment the department are encouraged to contact the Laboratory Quality Manager, Laboratory Directorate Manager or the Clinical Service Led to discuss further.

Alternatively, patients or their representatives may raise complaints/concerns/compliments through the Hospitals patient relations team by telephone, letter or e-mail as follows:

Patient Experience Team,
Clatterbridge Hospital,
Birch House,
Clatterbridge Road,
Bebington,
Wirral
CH63 4JY.

Tel: 0800 432 0251 (Monday to Friday, 09:00 to 16:00 hours)

Email: wuth.patientexperience@nhs.net

9. Requirements for request forms (CERNER MILLENIUM, ICE, MEDITECH and Handwritten forms)

Requests are communicated to the laboratory by the following methods:

- Cerner Millennium forms generated at ward level.
- Cerner Millennium labels generated at ward level.
- MEDITECH forms generated at CCC ward level.
ICE forms generated by the GP practices.
- Handwritten downtime forms
- Individual GP request forms

All verbal requests to the laboratory **must** be accompanied by one of the above request forms for the test to proceed.

It is **ESSENTIAL** that the laboratory knows the date on which a specimen is taken as processing delayed specimens can yield unhelpful or frankly misleading results. In addition, if a request for malarial parasite screening is made, all relevant clinical details, prophylaxis treatment and history of foreign travel is required.

WUTH wards and departments

All requests for haematology tests should be made electronically on the Hospital Information System (HIS). CERNER is the hospital paperless system that will not generate a request form EXCEPT for transfusion requests. All CERNER requests should have a status collected in CERNER. The specimens should be sent with the printed label on the specimen. All the above details are necessary to include when making a CERNER request.

Once a request has been made the appropriate request documentation will be generated. This will either be a sample label (CERNER request), request form for transfusion (CERNER) or a future request form (CERNER).

In the event of HIS downtime, downtime request forms provided must be used. These are supplied to wards by the IT department as part of a downtime pack. The essential

information required, as indicated in Wirral University Teaching Hospital NHS Foundation Trusts *Standard for Labelling of Laboratory Specimens Policy*, policy reference number 044, MUST be completed.

CCC wards and departments

All requests for haematology tests should be made electronically via MEDITECH. Once a request has been made the appropriate request documentation will be generated, a MEDITECH request form.

In the event of MEDITECH downtime, downtime request forms supplied by CCC IT department must be used. The essential information required, as indicated in Wirral University Teaching Hospital NHS Foundation Trusts *Standard for Labelling of Laboratory Specimens Policy*, policy reference number 044, MUST be completed.

General practitioners

All requests for haematology tests should be made electronically on Communications ICE. ICE request forms are generated by the phlebotomist following blood sample collection and have the date and time of completion of collection sent electronically to the laboratory IT system along with the electronic test request. In the event of ICE downtime, paper request forms approved by the laboratory MUST be completed.

10. Labelling requirements for specimens

- The specimen must be labelled with the patient details as on the request form. Where no request form exists, for example, Cerner requests, the sample must be labelled with the identification details contained in the patient's wristband.
- The specimen must be labelled with the date of collection.
- Please note that unlabelled, inadequately labelled, or mislabelled specimens cannot be processed and will be discarded.

The criterion for sample acceptance is described in Wirral University Teaching Hospital NHS Foundation Trusts *Standard for Labelling of Laboratory Specimens Policy*, policy reference number 044. The criterion for blood transfusion sample acceptance is also detailed in *Blood Component Transfusion Policy*, policy reference number 019. This is strictly adhered to in the interest of patient safety.

The process of collecting blood samples is described in the Wirral Hospital Trust Training Policy for the collection of Blood samples and Policy 044 *Labelling of Laboratory Specimens*. These documents are published and are available for download on the Wirral Hospital Intranet site and copies are also available on application to Clinical Biochemistry secretary extension 2094 at Arrowe Park Hospital.

Blood Film	24 hours
ESR	48 hours
Reticulocytes	24 hours
Coagulation tests	4 hours
D-Dimers	24 hours after blood have been withdrawn.
Glandular Fever Screen	48 hours
Malarial Parasites	24 hours after blood have been withdrawn.
B12, Folate	72 hours (if Biochemistry sample available)
Sickle Screen	36 hours

Sample may be disposed of before time limit is reached.

Standard procedures for the safe collection of specimens

Only staff trained and deemed competent should perform venepuncture.

The process of collecting blood samples is described in the Wirral Hospital Trust Training Policy for the collection of Blood samples and Policy 044 Labelling of Laboratory Specimens. These documents are published and are available for download on the Wirral Hospital Intranet site and copies are also available on application to Clinical Biochemistry secretary extension 2094 at Arrowe Park Hospital.

Wirral Hospitals and the Wirral CCG use the Greiner Vacuette system for blood collection. Guidance on the tube top colour and Vacuette system is shown below:

If several profile combinations are requested, please send more than 1 sample.

As far as sample volume is concerned all blood collection tubes must be filled to the line on the tube using the vacuum collection system, typically 4ml for adult blood collection tubes and 1.5 ml for paediatric blood collection tubes. The tube type is indicated against each test in the reference range section.

12. Haematology Blood Collection Charts

VACUETTE® SELECTION CHART

Wirral University Teaching Hospitals NHS Trust








VAWL02 VERSION: June 2019

Samples must be labelled with surname, given name, DOB and Case Sheet Number



Item Number	Cap Colour	Cap Ring Colour	Tube Type	Tests	Special Instructions	
TAKE BLOOD CULTURES FIRST, THEN THE REQUIRED TESTS IN THE ORDER SHOWN						
1			Clotting Accelerator and Separation Gel	BIOCHEMISTRY: General profiles, TFT's, CRP, Lithium, Iron, Therapeutic Drug Assays, Electrophoresis, Troponin T, Antibiotic Assays, PTH, B12, Folate, Ferritin, Copper, Zinc, Tumour markers, Pro BNP, Vitamin D, Type III Procollagen amino peptide, Thyroglobulin ANCO antenatal screening only (separate tube)	IMPORTANT After collection ochre tubes need to stand for 30 minutes prior to centrifugation For very urgent samples please use Lithium Heparin	
				IMMUNOLOGY: Auto Antibodies (ANA, SMA, AMA, LKM, GPC), ANCA, dsDNA, ENA, GBM, Coeliac screen (tTG, EMA), Intrinsic Factor (IFA), CCP, Skin Abs, Anti Cardiolipin (ACA & B2 glycoprotein), Avian Precipitins, Aspergillus Precipitins, Farmers Lung, Anti Phospholipase A2 Receptor (PLA2R), IgE & RAST. Thrombophilia screen (part of) x 1		
2			Trisodium Citrate	INR, Clotting Screen, APTT, D-Dimer, Lupus Anticoagulant, Thrombophilia screen (part of), Von Willibrand screen	ENSURE TUBES ARE FILLED TO THE SPECIFIED MARK Thrombophilia screen: See notes at bottom of chart	
3			Li Heparin	URGENT TESTS & RENAL PATIENTS. Urea and electrolytes, Bilirubin, Calcium, General profiles, Pre-eclampsia profiles, CRP, Drug overdose, Troponin T, Magnesium, Alcohol, Salicylate, Paracetamol.	Remember to mix the sample gently after collection	
4			EDTA	FBC, ESR, Paul Bunnell, Malaria screen, Plasma Viscosity, Sickle screen, Thalassemia screen, Kleihauer, Thrombophilia screen (part of), HFE gene, ACTH, Cyclosporin, Tacrolimus, Sirolimus, TPMT, Lead, Cobalt & Chromium Ammonia - contact lab first (ext 2088) collect on ice	Mix six times after collection. Separate tube needed for: ACTH, Cyclosporin, Kleihauer, Sicklescreen Thrombophilia screen: See notes at bottom of chart	
				PCR FOR INFECTIOUS DISEASES. Meningococcal PCR, Pneumococcal PCR, HIV Quantitative PCR, HIV-1 genotype, HIV-1 anti-virogram, CMV PCR, HCV PCR genotyping	Hepatitis C PCR x 2 EDTA bottles. HIV-1 genotype x 1 EDTA bottle. HIV-1 antiviogram (phenotype) x 1 EDTA bottle.	
5			EDTA for Cross match	Group and Save Serum, Crossmatch, Direct Coombs, Group & Coombs, Cold Agglutinins	ENSURE TUBES ARE FILLED TO THE SPECIFIED MARK Samples must be handwritten and signed or bridge labelled at the bedside. Addressograph labelled samples will not be accepted. Samples must be labelled with surname, full Christian name DOB and case sheet no or NHS no.	
6			NaF/EDTA	Glucose, HbA1c, Lactate - contact lab first (ext 2088) collect on ice		
7			Sodium Heparin Trace Elements	Aluminium		
8			EDTA - Clotting Accelerator (no gel)	Cryoglobulin needs 1 x 4ml Red cap / Black ring tube and 1 x Lavender cap / Black ring tube brought to laboratory immediately at 37°C. (Contact ext. 2088 for flask prior to collection)		
Thrombophilia screen needs, 2 Light blue caps, 1 Lavender cap and 1 Ochre cap (gel tube)						
Joint fluid requires plain universal container and 1.3ml Lithium Heparin						
VACUETTE® Products and Accessories Safety Blood Collection Set + Luer Adaptor / Holder 450265 21G x 19cm (green) KFK137 450266 23G x 19cm (blue) KFK138		 Holder 450263 32% 111	 WBC PLUS Washback Needs 21Gx1.5 450040 32% 023 22Gx1.5 450041 32% 017	 QUICKSHIELD 450250 32% 257	 Disposable Tournequets 640053 FWJ 013	 IMPORTANT: Hold tube in place with thumb until filled to the required level
FOR OTHER TESTS CONTACT THE LABORATORY Clinical Biochemistry 3056 Haematology 3053 Coagulation 3053 Blood Bank 2100 Microbiology 4111						

VACUETTE®
 Instructions for Use

- 1  First of all remove the cover over the valve section of the multistep needle.
- 2  Screw the needle into the tube holder.
- 3  Insert the needle into the vein as usual.
- 4  Push the tube into the holder and onto the needle valve purifying the rubber diaphragm. Hold tube in place with the thumb until tube is filled to the required level.
- 5  When the first tube is full and the blood flow ceases remove it from the holder. Further samples can then be collected by introducing more tubes into the holder.
- 6  Mix tubes by inversion 6-8 times. After the last tube has been collected remove the needle from the vein.
- 7  For safety reasons carefully dispose of the needle in the sharps box.



 **greiner blo-one**

Greiner Blo-One Ltd
 Etrich Way
 Stockport Business Park
 Stockport
 Cheshire SK10 5SQ
 Tel: 01457 852265
 Fax: 01457 852296
 email: sales@uk.greiner.com
 www.wirralnhs.uk



Wirral University Teaching
 Hospitals NHS Trust

VACUETTE®
Selection Chart








Paediatric SELECTION CHART

Wirral University Teaching Hospitals NHS Trust



VACUETTE®

Item Number	Cap Colour	Tests	Specific instructions and Minimum Fill Volumes for Paediatric send away tests
459 092 Serum	 Red	<p>Biochemistry: Chemistry profile, Urea and Electrolytes, LFT, Bone profile, TFT, CRP, Bilirubin, Calcium/Magnesium, Iron, Therapeutic drugs, Troponin T, Antibiotics, PTH, B12, Folate, Ferritin, Copper/Zinc, Vitamin D, Vitamin A, Vitamin E.</p> <p>Immunology: IgE & RAST, ANCA, ANF, ENA, GBMAb, autoantibodies</p> <p>Microbiology: Serology.</p>	<p>Androstenedione (1ml), DHEAS (1ml), Insulin/C-Peptide (contact Biochemistry prior to collection), Long chain & very long chain fatty acids (1ml), VITAMIN SAMPLES MUST BE PROTECTED FROM LIGHT i.e Vitamin A (1ml), Vitamin E (1ml)</p>
459 036 EDTA	 Lavender	<p>Haematology: FBC, ESR, Paul Bunnell, Malaria Screen, Sickle screen, Thalassaemia, Microbiology: Molecular PCR Biochemistry: Ammonia, Lead, ACTH, Cyclosporin, Tacrolimus Transfusion: Birth to 4 months: Blood Group and Coombs in paediatric lavender bottle Cord Group and Coombs in adult pink transfusion bottle 4 months onwards: Blood Group and Save in adult pink transfusion bottle (minimum volume: 1ml)</p>	<p>Acylcarnitine (1ml), ACTH (1ml) (transport to lab immediately), Alpha-galactosidase (2ml), White cell enzymes (contact Biochemistry prior to collection), Lead (1ml), Manganese (3ml)</p> <p>For advice on Molecular Genetics tests, please contact Liverpool Women's Hospital on 0151 702 4228</p>
459 084 Lithium Heparin	 Green	<p>Biochemistry: Chemistry profile, Urea and electrolytes, LFT, Bone profile, CRP, Bilirubin, Calcium/Magnesium, Salicylate, Paracetamol, Troponin T, Alcohol.</p>	<p>17 OHP (1ml), Amino acids (1ml), Carnitine (1ml), Free fatty acids (1ml), Galactose screen (1.4ml), Phenylalanine (1ml) VITAMIN SAMPLES MUST BE PROTECTED FROM LIGHT i.e. Thiamine (Vitamin B1) (2.5ml), Vitamin B2 (5ml), Vitamin B6 (5ml), Vitamin K (2ml)</p> <p>For advice on Cytogenetics tests, please contact Liverpool Women's Hospital on 0151 702 4229</p>
459 085 NAF / EDTA	 Grey	<p>Glucose, HbA1c, Lactate contact lab first (ext 2088) collect on ice</p>	
459 075 Trisodium Citrate	 Blue	<p>INR, Clotting screen, APTT, D-Dimer, Von Willebrand screen.</p>	<p>Ensure filled to correct level.</p>



Greiner Bio-One Ltd
 Brunel Way
 Stroudwater Business Park
 Stonehouse, Glos. GL10 3SX
 Tel: 01453 825255
 Fax: 01453 828286
 e.mail: sales@uk.gbo.com
 www.vacurette.com
 VAAS03 VERSION JUNE 2019

Manual Erythrocyte Sedimentation Rate (ESR) testing for Paediatric patients (<14yrs):

The Haematology service now offers manual ESR tests specifically for paediatric patients due to the reduced volume of blood required. It is a non-specific test should be requested under specific clinical conditions. Please liaise with the Haematology Consultants via the switchboard if required.

Sample Collection:

Blood for ESR testing should be collected into a block top 3.2% sodium citrate sample. The volume of blood required for this test is reduced to 1.5mls for paediatric patients.

13. Transport of clinical specimens to the Laboratory

Packaging and transport

Before the specimens are collected by Porters, Couriers, Volunteers, Nursing or Support staff, it is the responsibility of the person taking the sample to ensure that specimens and request forms are placed correctly into the mini-grip plastic bags. Specimens should be placed in the pocket of the plastic bag and grip seal sealed. The request form should be placed into the sleeve of the plastic bag. The mini-grip bags should then be placed in the **RED** Blood Sciences specimen biohazard bag for collection.

The mini-grip transport bags, if properly sealed, are designed to contain accidental specimen leakage from containers. Spontaneous specimen discharge, due to defective materials, is rare as the hospital supplies CE marked specimen containers. Most incidents of specimen leakage or loss are due to either failure to ensure the specimen container is sealed correctly or the mini-grip bag has not been closed securely.

If there is to be a delay in transporting the sample to the laboratory, advice from the laboratory regarding appropriate storage should be sought. Specimens that are to be transported by taxi should be placed in a specimen tin or sealed in a Transport bag.

Specimens collected from Arrowe Park Hospital

Monday to Friday from 9.00 am until 2.00 p.m. daily there is an hourly collection of pathology specimens from wards by the portering staff,

After 2.00 p.m., bleep porters on bleep 2074 to pick up specimens. Alternatively, samples may be sent to the laboratory via a pneumatic air tube system (pod) which has stations in various locations around the Arrowe Park site.

Weekends and Bank holidays There are no scheduled collections for pathology samples on weekends or bank holiday. To arrange sample collection by a

porter, bleep 2074. Alternatively, samples may be sent to the laboratory via the air tube system.

Samples are delivered between the Arrowe Park, Clatterbridge Cancer Centre, and Microbiology at Bromborough sites by WUTH internal transport on a regular basis during core hours.

Specimens collected from Community and GP Practices

Samples from the community are transported either by a courier, phlebotomists, or by the hospital transport system in laboratory designated bags/boxes. Samples should be transported to the laboratory within 4 hours from venepuncture. Samples should be kept at ambient temperature, with avoidance of extreme temperatures, prior to dispatch ERS Medical Courier Services provide collection of specimens from General Practice for Laboratory Medicine Monday to Friday.

Members of the public who come across specimen boxes containing specimens should follow the instructions printed on the box.

14. Haematology Tests and Turnaround Times

All turnaround times are stated in working days

Turnaround time is defined as time from receipt in laboratory to result released

Working days – Monday – Friday 9am – 5.30pm

Test / investigation	Container and comments	Turnaround Times
A		
Adamts-13	3.5ml BLUE Trisodium citrate (Filled to black line on bottle)	10 working days Sent to RLBUHT
Ante Natal Group and Screen	6ml PINK EDTA	72 hrs
Anti Xa	3.5ml BLUE Trisodium citrate (Filled to black line on bottle) This test requires a separate container. Sample to be sent 4 hours post heparin dose Exception: Those patients on Direct Oral Anticoagulant (DOAC) e.g., Apixaban, Rivaroxaban or	Routine 4 hrs If Sendaway: 5 working days

Test / investigation	Container and comments	Turnaround Times
	Edoxaban samples are sent to Liverpool Clinical Laboratories	Sent to LCL
APTT	3.5ml BLUE Trisodium citrate (Filled to black line on bottle)	Routine 6 hrs / Urgent 1hr
B		
BCR/ABL fusion gene quantitation	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT

Test / investigation	Container and comments	Turnaround Times
9:22 translocation t (9:22) screening	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT
Bone Marrow Trepine and aspirate	4 ml LAVENDER EDTA Min volume Aspirate 0.5ml Samples to arrive before 3pm on Fridays.	Urgent 14 working days, Routine 21 days Sent to RLBUHT
C		
CD4	4 ml LAVENDER EDTA Min volume 3ml	5 working days Sent to RLBUHT
Cell markers	4 ml LAVENDER EDTA This test requires a separate container Peripheral sample min vol 1ml or Bone marrow sample 0.5ml	5 working days Verbal result for urgent samples 2hrs Sent to RLBUHT
Clotting screen	3.5ml BLUE Trisodium citrate or 1.3ml paediatric Trisodium citrate (Filled to black line on bottle)	Routine 6 hrs / Urgent 1hr

Test / investigation	Container and comments	Turnaround Times
Cold agglutinins	2 x 6ml PINK EDTA	5 working days Sent to NHS Blood & Transplant RCI, Speke
Confirmation of variant Hb / thalassaemia	4 ml LAVENDER EDTA This test requires a separate container Specific written patient consent is required by referral laboratory (M-LP-019)	4 weeks Confirmation sent to Manchester University Foundation trust

Test / investigation	Container and comments	Turnaround Times
D		
D-Dimer	3.5ml BLUE Trisodium citrate or 1.3ml paediatric Trisodium citrate (Filled to black line on bottle)	Routine 6 hrs / Urgent 1 hr
Direct Coombs test	6ml PINK EDTA	6 -hours
E		
Erythrocyte Sedimentation Rate (ESR)	4 ml LAVENDER EDTA	Routine 6 hrs / Urgent 1 hrs
ESR (manual) for paediatric patients	1.6mls in ESR tube containing 3.2% sodium citrate	Routine 6 hrs / Urgent 2 hrs
Erythropoietin	4 ml OCHRE This test requires a separate container	15 working days Sent to St James University Hospital, Leeds
F		
Factor assays	3.5ml BLUE Trisodium citrate	5 working days

Test / investigation	Container and comments	Turnaround Times
	(Filled to black line on bottle	Treatment plan 2hrs
Factor XIII assay	3.5ml BLUE Trisodium citrate (Filled to black line on bottle	60 mins – 2wks depending on urgency in TD Sent to RLBUHT
FBC	Adult - 4 ml LAVENDER EDTA or Paediatric – 1.3ml EDTA	Routine 6 hrs / Urgent 1 hr
FBC (GP)	Adult - 4 ml LAVENDER EDTA or Paediatric – 1.3ml EDTA	24 hrs
FBC (GP) with film	Adult - 4 ml LAVENDER EDTA or Paediatric – 1.3ml EDTA	72 hrs
Factor V Leiden	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT
G		
Group and Coombs test	Cord blood – 6ml PINK EDTA or Capillary sample – 1.3ml EDTA	Routine 6 hrs / Urgent 2 hrs
Group and Screen	6ml PINK EDTA	Routine 6 hrs / Urgent 2 hrs
G6PD	4 ml LAVENDER EDTA Min volume 0.5ml	4 working days Sent to RLBUHT
H		
Haem-oncology Cytogenetics	Bone marrow transport media available from laboratory	Routine 28 days Urgent 10 days to 1 week Rapid 24hrs to 3days Sent to Liverpool Women's NHS Foundation Trust
HFE gene	4 ml LAVENDER EDTA	28 working days

Test / investigation	Container and comments	Turnaround Times
	This test requires a separate container	Sent to Liverpool Women's
HIT screen	3.5ml BLUE Trisodium citrate This test requires a separate container (Filled to black line on bottle)	5 working days Sent to RLBUHT
HLA B27	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT
Human Leukocyte Antigen (HLA)	4 ml LAVENDER EDTA This test requires a separate container (5ml min volume)	10 working days Sent to RLBUHT
I		
INR	3.5ml BLUE Trisodium citrate (Filled to black line on bottle)	Routine 6 hrs / Urgent 1hr
J		
JAK2 V617F mutation	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT
K		
Kleihauer	4 ml LAVENDER EDTA Min volume 1ml	48 hrs Confirmation of positive result sent to NHS Blood and Transplant, RCI laboratory
L		
Lupus anticoagulant	3.5ml BLUE Trisodium citrate	5 working days
M		
Malarial parasite screen.	4 ml LAVENDER EDTA Min volume 1ml	Initial report within 2 hrs Confirmation of positive result, sample sent to

Test / investigation	Container and comments	Turnaround Times
	Exception: <i>Plasmodium Knowlesi</i>	Liverpool Tropical Medicine verbal report same day of receipt Mon-Fri
P		
Paul Bunnell	4 ml LAVENDER EDTA	24 hrs
Plasma viscosity	4 ml LAVENDER EDTA Min volume 2ml	Routine 5 working days Urgent verbal report 2hrs from receipt of sample at Wrexham Maelor Hospital Sent to Wrexham Maelor Hospital
Prothrombin 20210A mutation	4 ml LAVENDER EDTA This test requires a separate container	10 working days Sent to RLBUHT
R		
Reticulocytes	4 ml LAVENDER EDTA	Routine 6 hrs / Urgent 1hr
S		
Sickle screen	4 ml LAVENDER EDTA	Routine 3 working days / Urgent 2 hours
T		
Thalassaemia screen	4 ml LAVENDER EDTA This test requires a separate container	3 working days
Thrombophilia screen	3.5ml BLUE Trisodium citrate (x3) and 4 ml LAVENDER EDTA and 4 ml OCHRE	5 working days
Transfusion reaction investigation	6ml PINK EDTA and 4 ml LAVENDER EDTA and 3.5ml BLUE Trisodium citrate and 4ml OCHRE top sample and Blood cultures	6 -hrs during routine hours 24 hrs during non-core hours

Test / investigation	Container and comments	Turnaround Times
V		
Von Willebrands screen	3.5ml BLUE Trisodium citrate	5 working days Treatment plan 2hrs

15. Referred Out Samples

The turnaround of each of the referred-out tests is contained in the table above and in the laboratory's Referred Out Test Directory. Please contact laboratory for details for a specific test.

Specialist Referral Tests

There are additional specialist tests, listed below, that are not included in the information above due to rarity of frequency of requirement. Please contact laboratory for details of specimen requirements and turnaround times.

APL (Acute Promyelocytic Leukaemia)
 Hypereosinophilia
 Pyruvate Kinase (PK)
 TCR Gene Rearrangement
 Platelet Refractoriness
 NAIT (neonatal autoimmune thrombocytopenia)
 PNH Screen (Paroxysmal nocturnal haemoglobinuria)
 Fetal genotyping

16. Key factors which affect the performance and or result of a haematology Test

- The technical competency, bias and experience of the staff performing the test.
- The patient sample, how it is taken, stored, and transported to the laboratory
- Delayed sample delivery to the laboratory
- Clotted or partially clotted sample for a test which requires whole blood or plasma
- Sample collected into an incorrect container
- Dilution of the sample if the sample is taken from a drip arm
- Expelling the sample through a needle into the sample container or over vigorous mixing resulting in haemolysis
- Sample taken after a fatty meal or from a patient receiving intra-lipid resulting in a lipaemic sample
- Heparin and other contaminating fluids from venous line samples

- Samples collected by capillary puncture from children are more prone to interference than samples collected by venepuncture in adults. The most common interference is haemolysis

17. Criteria for rejection of pathology samples

Some of the common reasons a Haematology request may be rejected:

- Unlabelled and incorrectly labelled samples will be rejected see minimum labelling requirement for all samples.
- Samples collected in the incorrect container.
- Coagulation bottles not filled to the fill line – under -filled and over -filled samples will be rejected.
- Samples received by the laboratory, upon analysis that are haemolysed, lipaemic or Icterus, depending upon severity may affect some test parameters and as such the affected test results may not be available.
- Samples not collected following the laboratory procedure.
- Spurious results due to inappropriate collection.
- Leaked samples
- Out of date sample containers
- Insufficient samples
- Old/aged samples

It is the responsibility of the clinician requesting the test to ensure that the details on the request form are accurate and complete.

It is the responsibility of the person taking the sample to ensure that the sample is correctly labelled.

18. Haematology reference intervals

TEST FBC	Adult Reference Range	Units	Remarks
WCC	3.5 – 11.0	x 10 ⁹ /L	Male/Female
RBC	4.25 – 5.55 3.80 – 4.85	x 10 ¹² /L	Male Female
Haemoglobin	130 – 166 112 – 148	g/l	Male Female
RDW	11.7 – 13.7 11.4 – 14.6		Male Female
Haematocrit	0.385 – 0.490 0.340 – 0.450	ratio	Male Female
MCV	80 – 100 80 – 100	fl	Male Female
MCH	28.1 – 32.1 26.2 – 33.8	pg	Male Female
MCHC	323 – 354 313 – 349	g/l	Male Female
# Neutrophil	1.8 – 8.0	x 10 ⁹ /L	Male/Female
# Lymphocyte	0.6 – 4.4	x 10 ⁹ /L	Male/Female
# Monocytes	0 – 0.8	x 10 ⁹ /L	Male/Female
# Eosinophils	0 – 0.5	x 10 ⁹ /L	Male/Female
# Basophils	0 – 0.3	x 10 ⁹ /L	Male/Female
# NRBC	0 -0.1	x 10 ⁹ /L	Male/Female
Platelets	150 – 400	x 10 ⁹ /L	Male/Female

Neonate:

Parameter	Units	1 Day	3 Days	2 Weeks	1 Month	2 Months
WCC	x 10 ⁹ /L	9.0 – 18.4	9.0 – 18.4	5.0 – 18.0	5.0 – 18.0	5.0 – 18.0
RCC	x 10 ¹² /L	3.80 – 6.50	3.80 – 6.50	3.2 – 6.4	2.80 – 5.30	2.60 – 4.30
Hb	g/l	140 – 220	140 – 220	125 – 205	100 – 170	90 – 135
Hct	Ratio	0.450 – 0.670	0.450 – 0.670	0.39 – 0.63	0.310 – 0.550	0.280 – 0.420
MCV	fl	98 – 130	94 – 130	86 – 120	85 – 120	77 – 115
MCH	Pg	31.0 – 39.0	30.0 – 37.0	28.0 – 37.0	27.0 – 36.0	29.0 – 34.0
MCHC	g/l	300 – 360	300 – 360	280 – 360	290 – 365	290 – 365
Neutrophil	x 10 ⁹ /L	4.8 – 17.1	2.0 – 9.4	1.7 – 6.0	1.0 – 9.0	1.0 – 9.0
Lymphocyte	x 10 ⁹ /L	2.0 – 7.3	2.0 – 7.3	2.8 – 9.1	3.0 – 13.5	3.0 – 13.5
Monocyte	x 10 ⁹ /L	0.1 – 1.9	0.1 – 1.9	0.1 – 1.7	0.1 – 1.7	0.1 – 1.7
Eosinophil	x 10 ⁹ /L	0 – 0.8	0 – 0.8	0 – 0.8	0 – 0.8	0 – 0.8
Basophil	x 10 ⁹ /L	0 – 0.2	0 – 0.2	0 – 0.2	0 – 0.2	0 – 0.2
NRBC	x 10 ⁹ /L	0.18 – 0.36	0.18 – 0.36	0 – 0.1	0 – 0.1	0 – 0.1
Platelets	x 10 ⁹ /L	150 – 400	150 – 400	150 - 400	150 – 400	150 – 400
Reticulocytes	%	3 – 7	1 – 3	0.4 – 3	0.4 - 3	0.4 – 3
Manual ESR	mm in 1hr	2 – 8	2 – 8	2 – 8	2 – 8	2 – 8

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

Child:

Parameter	Units	6 Months	1 Year	2 Years	2 – 7 Years	8 – 14 Years
WCC	x 10 ⁹ /L	5.0 – 17.0	5.0 – 17.0	5.0 – 17.0	6.3 – 16.2	4.9 – 13.7
RCC	x 10 ¹² /L	3.6 – 5.0	4.1 – 5.3	4.0 – 5.0	4.00 – 5.00	4.00 – 5.20
Hb	g/l	100 – 141	100 – 141	100 – 148	100 – 148	115 – 158
Hct	Ratio	0.300-0.410	0.310 – 0.410	0.310 – 0.430	0.310 – 0.430	0.34 – 0.470
MCV	fL	72 – 95	73 – 92	73 – 90	74 – 88	76 – 92
MCH	Pg	25.0 – 33.0	24.0 – 32.0	23.0 – 32.0	25.0 – 32.0	25.0 – 33.0
MCHC	g/L	300 – 365	300 – 365	300 – 365	310 – 365	310 – 365
Neutrophil	x 10 ⁹ /L	1.0 – 8.5	1.5 – 8.5	1.5 – 8.5	1.6 – 9.0	1.4 – 7.5
Lymphocyte	x 10 ⁹ /L	4.0 – 13.5	4.0 – 10.5	3.0 – 9.5	2.0 – 9.5	1.5 – 7.6
Monocyte	x 10 ⁹ /L	0.1 – 1.3	0.1 – 1.3	0.1 – 1.3	0.1 – 1.3	0.1 – 1.3
Eosinophil	x 10 ⁹ /L	0 – 0.8	0 – 0.8	0 – 0.8	0 – 0.8	0 – 0.8
Basophil	x 10 ⁹ /L	0 – 0.2	0 – 0.2	0 – 0.2	0 – 0.2	0 – 0.2
NRBC	x 10 ⁹ /L	0 – 0.1	0 – 0.1	0 – 0.1	0 – 0.1	0 – 0.1
Platelets	x 10 ⁹ /L	150 - 400	150 – 400	150 – 400	150 – 400	150 – 400
Reticulocytes	%	0.4 – 3	0.4 – 3	0.4 – 3	0.4 – 3	0.4 – 3
Manual ESR	mm in 1hr	2 – 8	2 – 8	2 – 8	2 – 8	2 – 8

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

TEST	Adult Reference Range	Units	Remarks
ESR	1 – 15 1 – 20	mm/h	Male Female Note - Increases with age
Plasma Viscosity	1.50 – 1.72	mPas	
Reticulocytes	0.5 – 2.0	%	
Blood Film (Associated with FBC)	N/A		Interpretative cytology report. Relevant clinical data must be provided when requested.
Paul Bunnell	N/A		Screening test for Glandular Fever
EPO	3-18	u/ml	
Malarial Parasites	N/A		Laboratory must be contacted, area of travel, prophylaxis and symptoms must be provided. Screening slide test does not detect P Knowslei
Thalassaemia Screen			Interpretative report provided with each request
Hb F	0 – 0.8	%	
Hb A2	1.9 – 3.4	%	
Haptoglobins	0.7 – 3.8	g/L	
Factor V Leiden			Interpretative report provided with each request
Prothrombin 20210A			Interpretative report provided with each request
HFE Genotyping			Interpretative report provided with each request
JAK2 V617F			Interpretative report provided with each request
CD4	0.75 – 2.28	10 ⁹ /L	Interpretative report provided with each request
Cell marker studies			Interpretative report provided with each request

19. Coagulation reference intervals

Test	Adult Reference Range	Remarks
Prothrombin Time	10-13 secs	Affected by oral anticoagulants including DOACs
INR	0.9 – 1.2	Affected by oral anticoagulants
APTT	25 – 37 secs	Affected by heparin and DOACs
Fibrinogen	2.0 – 4.5 g/L	Affected by Dabigatran
Clotting Screen		Comprises: INR, APTT and fibrinogen
D-Dimer	< 200 ng/ml	Performed for query DVT and PE only
Protein C	70 – 150%	Affected by oral anticoagulant, pregnancy, and current thrombotic events
Free Protein S	Female - 50 -130%	Affected by oral anticoagulant, pregnancy, and current thrombotic events
	Male – 70 -130%	
Antithrombin III	85 – 120%	Affected by heparin and DOACs
Von Willebrand screen		Interpretative report.
Lupus ratio	0.9 – 1.2 Ratio	Interpretative report.
Corrected lupus ratio	0.9 – 1.2 Ratio	Interpretative report.
Thrombophilia Screen		Interpretative report.
Factor II	60 – 160%	
Factor V	70 – 150%	
Factor VII	60 – 160%	
Factor VIII	50 – 150%	
Factor IX	55 – 150%	
Factor X	60 – 120%	
Factor XI	55 – 150%	
Factor XII	56 – 140%	
Anti Xa		Dependant on anticoagulant and dose
vWF: Ristocetin Cofactor Activity (%)	50 – 200%	

vWF: Antigen (%)	50 – 200%	
------------------	-----------	--

Paediatric coagulation reference intervals

Test	15days-4weeks	1-5 months	6-11 months	1-5 yrs.	6-10 yrs.	11-17 yrs.
PT (sec)	9.5 - 12.6	9.7 - 12.8	9.8 - 13.0	9.9 - 13.4	10.0 - 14.6	10.0 - 14.1
APTT (sec)	27.6 - 45.6	24.8 - 40.7	25.1 - 40.7	24.0 - 39.2	26.9 - 38.7	24.6 - 38.4
Fibrinogen (g/L)	1.4 - 4.0	1.5 - 3.8	1.6 - 3.6	1.9 - 4.1	1.9 - 4.8	1.8 - 4.2
FII (%)	45 - 74	47 - 111	74 - 117	49 - 130	68 - 132	48 - 119
FV (%)	69 - 124	60 - 147	59 - 160	73 - 188	82 - 141	62 - 125
FVII (%)	55 - 108	43 - 141	55 - 128	48 - 124	55 - 135	55 - 133
FVIII (%)	65 - 153	50 - 187	53 - 132	59 - 167	61-154	43 - 155
FIX (%)	30 - 77	29 - 105	51 - 107	53 - 129	55 - 156	60 - 138
FX (%)	66 - 92	68 - 122	76 - 134	60 - 153	71 - 161	64 - 131
FXI (%)	33 - 75	28 - 126	61 - 126	58 - 154	32 - 154	55 - 139
FXII (%)	25 - 81	38 - 137	48 - 156	50 - 175	49 - 154	49 - 154
vWF: Ristocetin Cofactor Activity (%)	88 - 122	33 - 154	37 - 119	41 - 132	42 - 163	45 - 139
vWF: Antigen (%)	46 - 220	36 - 217	48 - 199	41 - 186	45 - 141	56 - 123
Antithrombin (%)	33 - 63	29 - 120	63 - 122	61 - 128	64 - 136	69 - 136
Protein C (%)	27 - 48	23 - 95	47 - 151	59 - 148	46 - 154	72 - 155
Free Protein S (%)	61 - 108	48 - 127	63 - 139	53 - 135	62 - 142	61 - 131

Ranges compiled from a multi-centre study using the same analysers and reagents used at WUTH.

Reference “Age dependency for coagulation parameters in paediatric populations. Results of a multicentre study aimed at defining the age-specific reference ranges.” Toulon P, et al. Thrombo Haemost 2016 July 4;116 (1)

20. Uncertainty of measurement

All laboratory results are subject to a degree of uncertainty in their measurement. This is due to biological variation, analytical measurement imprecision and pre-analytical factors (sample stability etc.). If you are concerned about the confidence limits and interpretation of an individual result, please contact the Haematology department

21. Unexpectedly abnormal results

The laboratory has standard operating procedures to ensure that results requiring immediate review are brought to the attention of the doctor requesting the test. Results are telephoned to the designated individual or location when they fall within telephone alarm levels. This is done in addition to returning the results through the hospital computer system. This procedure does not override requests written on request cards to phone results.

The telephone alarm levels which are used within Wirral Hospitals: –

TEST	LOWER THRESHOLD	UPPER THRESHOLD
Haemoglobin	75	-
Haematocrit	-	0.550
Platelets	50	1000
Neutrophils	0.5	50
Lymphocytes	-	50
Eosinophils	-	10
INR	-	5.0
D-dimer (requests by GP)		200
Fibrinogen	1.0	
Anti Xa		1.0
Malaria screening test result		

All other abnormal results are transmitted electronically to systems linked to the Laboratory computer. These include the hospital IT system and IT systems in General Practice.

Normal results are also returned in this way.

22. Directory of Addresses for Reference Laboratories

Alder Hey Children's Hospital

Alder Hey Children's NHS Foundation Trust
Haematology Laboratory
Eaton Road
Liverpool
L12 2 AP

Guy's Hospital

Dr Yvonne Morgan
Molecular Oncology Diagnostics Unit
GSTS Pathology
4th Floor, Southwark Wing
Guy's Hospital
Great Maze Pond
London
SE1 9RT

Kings College Hospital

Red Cell Centre
c/o Central Specimen Reception
Blood Sciences Laboratory
Ground Floor Bessemer Wing
King's College Hospital
Denmark Hill
London SE5 9RS

Leeds Teaching Hospital

Blood Sciences
Old Medical School
Leeds General Infirmary
Great George Street
Leeds
LS1 3EX

Liverpool School of Tropical Medicine

School of Tropical Medicine
Diagnostics Laboratory
Pembroke Place
Liverpool
L3 5QA

Liverpool Women's Hospital

Cytogenetics Laboratory
Northwest Genomics Hub – Liverpool Site
Liverpool Women's Hospital,
Crown Street,
Liverpool.
L8 7SS

Manchester University NHS Foundation Trust

Central Specimen Reception
NW RCI
Genomic Diagnostic Laboratory,
Manchester University NHS Foundation Trust,
6th Floor, St Mary's Hospital,
Oxford Road,
Manchester
M13 9WL

NHS Blood and Transplant

RCI Laboratory
NHS Blood and Transplant
14 Estuary Banks
Estuary Commerce Park
Speke
Liverpool
L24 8RB

H&I Laboratory
NHSBT Barnsley
Capital Way
Dodsworth
Barnsley
S75 3FG

H&I Laboratory
NHSBT Filton
500 North Bristol Park
Northway
Filton, Bristol
BS34 7QH

Directorate of Laboratory Medicine
Department of Blood Sciences
Section: Haematology

International Blood Group Reference Laboratory
NHS Blood and Transplant
500 North Bristol Park
Filton
BS34 7QH

Royal Liverpool and Broadgreen University Hospital Trust

Department of Haematology
3rd Floor Reception
LCL Clinical Support Services Building
Royal Liverpool University Hospital
Mount Vernon Street
Liverpool
L7 8YE

Department of Coagulation
3rd Floor Reception
LCL Clinical Support Services Building
Royal Liverpool University Hospital
Mount Vernon Street
Liverpool
L7 8YE

HODS Laboratory
4th Floor Specimen Reception
LCL Clinical Support Services Building
Royal Liverpool University Hospital
Mount Vernon Street
Liverpool
L7 8YE

Department of Immunology
Tissue Typing
3rd Floor Specimen Reception
LCL Clinical Support Services Building
Royal Liverpool University Hospital
Mount Vernon Street
Liverpool
L7 8YE

Salisbury District Hospital

Wessex Regional Genetics Laboratory
Salisbury District Hospital
Salisbury
WiltshireSP2 8BJ

St James University Hospital

Haemostasis Laboratory
Specialist Haematology
Block 32
St James University Hospital
Beckett Street
Leeds
LS9 7TF

Mike Short
HMDS
Level 3
Bexley Wing
St James University Hospital
Leeds
LS9 7TF

Wrexham Maelor Hospital

Haematology Laboratory
Maelor Hospital
Croesnewydd Rd.
Wrexham
LL13 7TD