PATHOLOGY USER GUIDE

2024 *version 32*

Mersey and West Lancashire NHS Teaching Hospitals NHS Trust Pathology Services is accredited to ISO15189:2012 and are undergoing transition assessments in 2024/25 to ISO15189:2022. Our accreditation is limited to those activities described in our UKAS (United Kingdom Accreditation Service) schedule of accreditation, Click here to access the website and type the department's UKAS ID:

8871 Biochemistry	8908 Cellular Pathology	8864 Haematology & Transfusion	8857 Microbiology

Unaccredited tests will be highlighted on reports with a comment or listed on the Pathology website: www.merseywestlancs.nhs.uk/pathology.

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Clinical Director of Pathology

Printed copies of this document are considered uncontrolled. Current version of this document is available at: www.sthk.nhs.uk/pathology; Trust Intranet and Pathology Quality Management System.
Please refer to section 12 for changes made to this version of the Pathology User Guide

Whiston Hospital

Blood Sciences, Clinical Biochemistry/Haematology & Blood Transfusion

The department is open 24/7

For Results: Please check CAREFLOW
All enquiries*: (0151 430) **1826** (Automated System)

***FOR ALL TRANSFUSION REQUESTS 24 HOURS CONTACT**
(0151 430) **1584**

Microbiology Department is sited at Whiston Hospital

The department is open 24/7

All enquiries: 0151 430 1837 or out of hours 0151 430 1652

(Please notify Microbiology Laboratory staff of any urgent work sent)

For results please check CAREFLOW at Southport and Ormskirk Hospital) or ICE first

Cellular Pathology is sited at Whiston Hospital

Histology/Cytology
08:00 – 20:00hrs (Mon – Fri)
08:00 – 16:00hrs (Sat & Sun)

Mortuary 08:30 – 17:00hrs (Mon – Friday)

All enquiries: 0151 430 1824

Urgent Frozen Section requests: 0151 430 1824

Bereavement Office is open 08:45 – 16:45hrs
Bereavement Office: 0151 430 1336 or 0151 430 1412

Out of hours mortuary service is available by contacting switchboard. The on-call Mortuary Technician is available to discuss viewing in exceptional circumstances and for all other enquiries

Southport and Ormskirk Hospitals

Blood Sciences, Clinical Biochemistry/Haematology &Blood Transfusion Southport and Ormskirk Hospitals

Southport Blood Sciences is open 24/7

For results please check on Careflow first

All Blood Science general enquiries: 01704 70 4179; Clinical Biochemistry enquires: 01704 70 4172; Haematology enquires: 01704 70 4175; Blood Transfusion enquiries: 01704 70 4176

Ormskirk Blood Sciences Reception is open Monday - Friday 08:30 - 17:00hrs
& weekend/Bank Holiday 09:00 - 14:00hrs
Reception: 01695 656236
Please call Southport site for all Biochemistry, Haematology and Blood Transfusion enquires.

OUT OF HOURS
Southport Site, as stated above
Ormskirk Site – all Blood Sciences departments, contact Southport Site numbers as stated above

Please contact Blood Transfusion on numbers above for all Urgent Blood Transfusion Requests

Microbiology Department is sited at Whiston Hospital

The department is open 24/7

All enquiries: 0151 430 **1837** or speed dial **#6406**

Please notify Microbiology Laboratory staff of any urgent work sent

For results please check CAREFLOW or ICE first

Southport & Ormskirk Mortuary and Bereavement

Mortuary is open: 08:30 – 16:30hrs
Mortuary enquiries: 01704 70 **4014**

Bereavement Office is open: 08:30 – 16:30hrs
Bereavement Office: 01704 70 **4135**

Southport/Ormskirk Hospital Out of hours Mortuary service is available through Switchboard:

01704 54**7471**/01695 57**7111**

1. INTRODUCTION

St Helens and Knowsley Teaching Hospitals NHS Trust and Southport and Ormskirk NHS Trust has formally come together as one Trust on the 1 July 2023. The new Trust is called Mersey and West Lancashire Teaching Hospitals NHS Trust (MWL). The pathology department is responsible for the delivery of pathology services covering MWL, as well as GP practices in the St Helens, Knowsley, Halton Clinical Commissioning groups (CCGs), Southport & Formby, Sefton and West Lancashire CCGs.

The pathology departments are based across 4 hospital sites with the main hub located in the Nightingale building at Whiston Hospital (see site plans, page 16-18)

Blood Sciences services hub based at Whiston Hospital and smaller essentials departments at sites at Southport and Ormskirk Hospitals.

Haematology and Coagulation Urgent Service based at St Helens Hospital, Monday to Friday mornings only.

Microbiology & Cellular Pathology Services will be based at Whiston Hospital site with onsite consultant cover on all Trust sites as required.

Mortuary Services based both at Whiston and Southport and Ormskirk Hospitals.
We hope that you will find this information useful; however, if there is anything that needs clarification, please do not hesitate to contact the department concerned.

Modern Laboratory Medicine is subject to continual improvement and this document will require regular revision. However, due to the difficulties in constantly updating printed versions, the electronic version available on the intranet will be the most up to date. Major changes in policies and procedures occurring between reprints will also be notified through the Trust Team Brief and global email system and to Primary Care as appropriate.

The guide summarises the range of services provided and includes information required to collect and transport appropriate samples to the laboratory for processing. It outlines the expected turnaround times for test results and provides contact details for key laboratory staff during the normal working day and out of hours.

The guide has been put together over many years in collaboration with our users and is regularly updated. Please let us know if there is any additional information that you would like to see covered within this document; all feedback is welcome and will help us develop the handbook and our services.

2. DUPLICATE REQUESTING AND RETESTING INTERVALS

Pathology requests have increased year on year. Audits have shown that there are numerous unnecessary duplicate requests received (FBC, LFT, Troponin, TFT etc.) from both inpatients and primary care contributing to this rise. Before requesting any test, ensure that it has not already been done by enquiring in the Laboratory Information Systems (LIMS)/ Telepath/Indigo Review/CAREFLOW/ICE or in the patient's notes. Also ensure all tests requested are to answer a specific question and are of immediate value to the patient; 'routine' or 'daily' FBC, UE, LFT etc. on a stable patient are of no value. Unnecessary duplicate requesting results in a decreased turnaround time for other patient samples and are a waste of resources for all members of staff including that of the patient.

Please refer to the RcPath (Royal College of Pathologist) the **National minimum retesting intervals in pathology guidance, published in 2021**. click here.

2.1. Biochemistry and Immunology Retesting Intervals

The MWL Biochemistry and Immunology department implement Minimum Retesting Intervals (MTI) based on the Royal College of Pathologists 2021 Guidelines, please click here.

Minimal retesting intervals are defined as the minimum time before a test should be repeated, based on the properties of the test and the clinical situation in which it is used. This is to identify and deal with inappropriate requesting of tests performed in the laboratory, to reduce unnecessary waste and optimise patient care.
A list of our MTIs applicable to adults are available in the following tables:

Biochemistry	
Test	**Re-testing Interval**
CRP	12 hrs
Hormones (FSH, LH, Testosterone)	7 days
Prolactin	28 days (1 month)
Iron Studies /Ferritin	28 days (1 month)
Lipids	28 days (1 month)
NT-Pro BNP (BNP)	84 days (3 months)
Thyroid Function Tests	28 days (1 month)
Anti-TPO Antibodies	84 days (3 months)
Anti-Thyroid Receptor Antibody	365 days (1 year)
Trace elements (Zn/Cu/Se)	28 days (1 month)
Tumour Markers (AFP, CA125, CA19-9, CEA, PSA)	28 days (1 month)
Urine Microalbumin	7 days
Vitamin B12/Folate	56 days (2 months)
Vitamin D	112 days (4 months)
Immunology	
Test	**Re-testing Interval**
Anti-Tissue Transglutaminase (ATTG)	84 days (3 months)
Serum Electrophoresis	84 days (3 months)
Immunoglobulins	84 days (3 months)
Serum Free Light Chains (SFLC)	168 days (6 months)
Complement (C3/C4)	84 days (3 months)
C1- Esterase Inhibitor	365 days (1 year)
Rheumatoid Factor	365 days (1 year)

Anti-CCP Antibodies	365 days (1 year)
Connective Tissue Disease screen (CTD)	84 days (3 months)
Tissue Autoantibody Screen (TAA)	365 days (1 year)
ANCA screen (MPO/PR3)	168 days (6 months)
Total IgE/ Allergy	365 days (1 year)

Certain rejected tests within an MTIs are reviewed by the Clinical Team and depending on previous results and clinical details, may be exempt from rejection and tested accordingly.

For further information please email BiochemistryClinical.Team@sthk.nhs.uk.

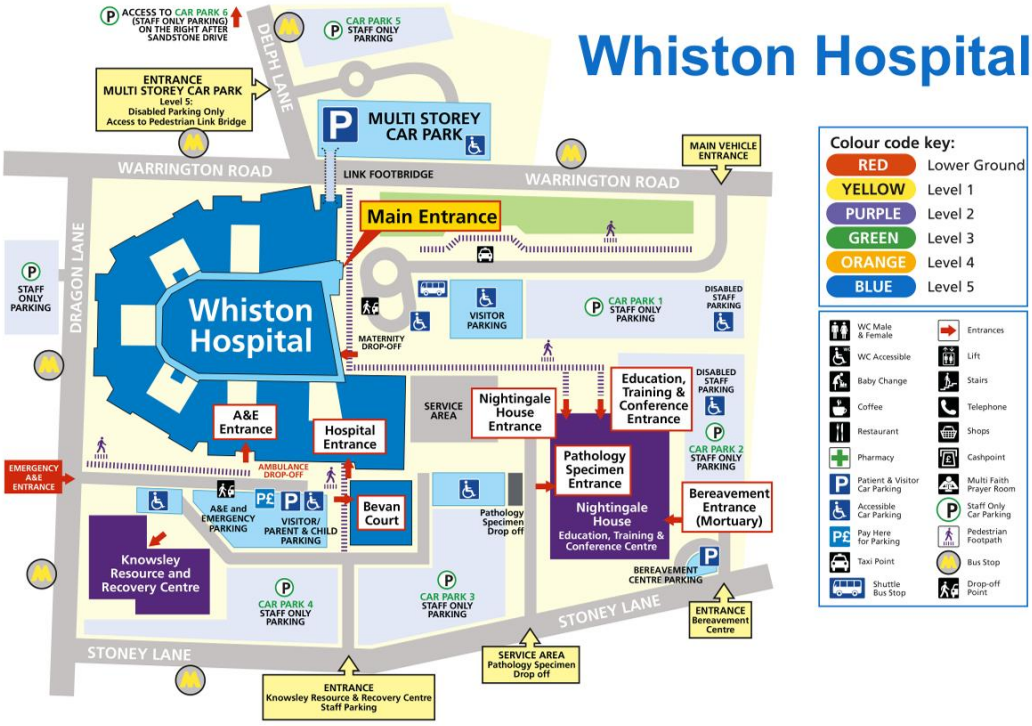
2.2. Haematology Minimum Retesting Intervals

Please refer to Royal College of Pathologists 2021 Guidelines, click here.

Further information and advice can be sought by contacting the department and clinical team for advice.

3. GENERAL INFORMATION

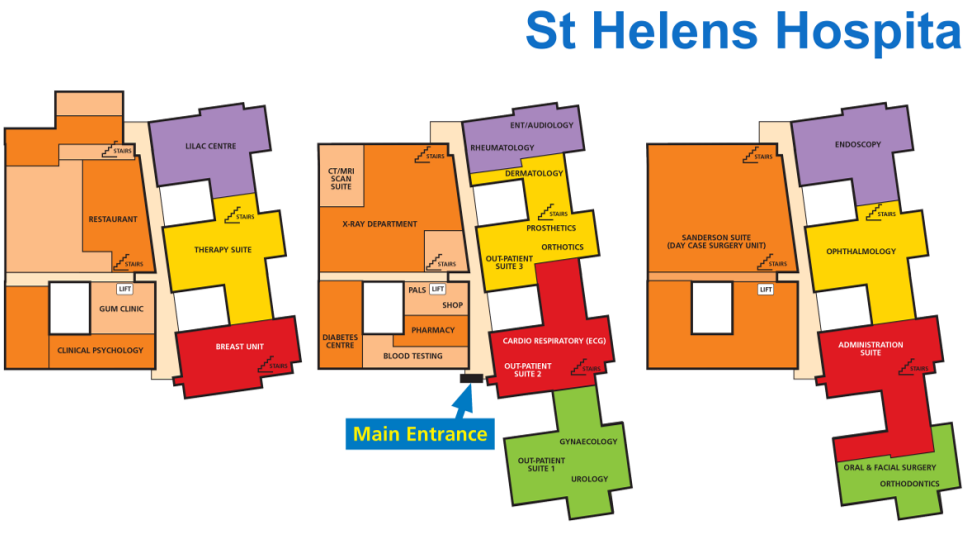
3.1. SITE MAP OF WHISTON HOSPITAL



To access site map on the website please click here.

Whiston Hospital Site Pathology department is located in Nightingale house.

3.2. MAP OF ST HELENS HOSPITAL



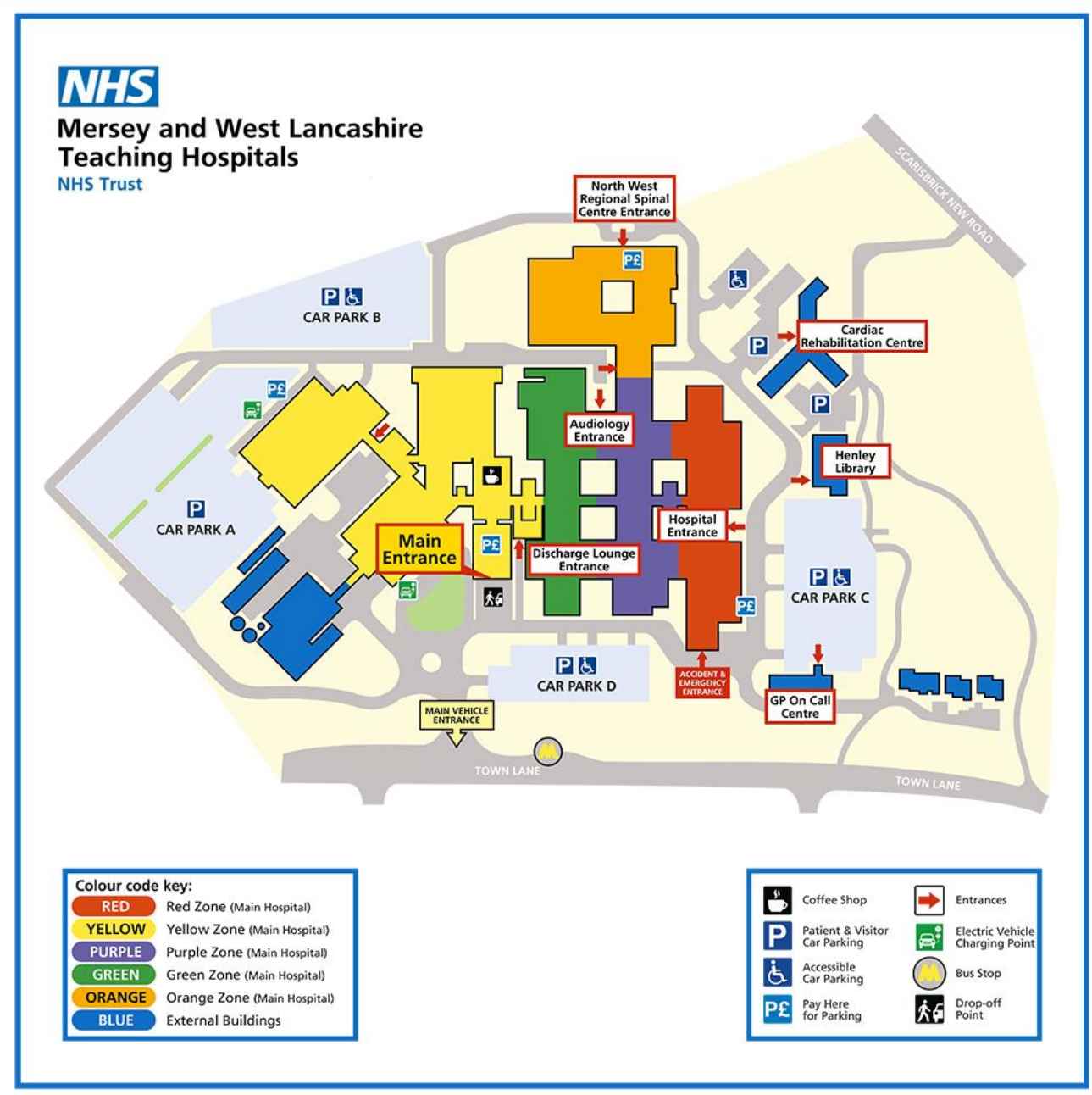
To access the site map on the website click here.

3.3. SITE MAP OF SOUTHPORT HOSPITAL

Southport Hospital Site Blood Sciences Laboratory is located on the ground floor. From the main entrance turn right onto the main corridor and take first corridor on the left, after Apple Jacks Coffee shop.

Mortuary and Bereavement office are located on the ground floor. From the main entrance turn left carry on straight until the corridor forks into 3 directions; please use the intercom at the start of the central corridor sign-posted bereavement and mortuary. Click here to access site map on website.

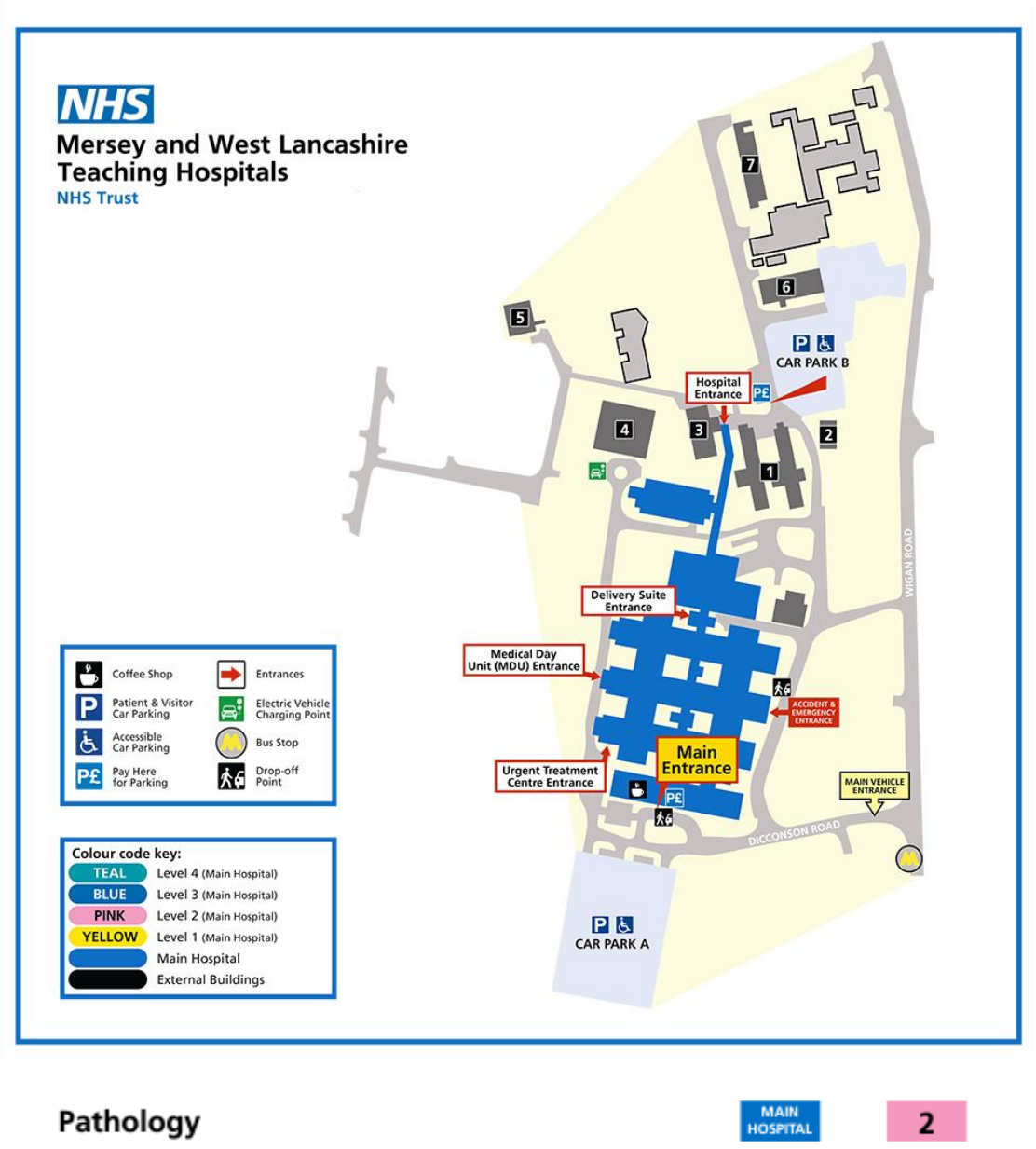
Pathology Service is located in the green zone. From the main entrance turn right, continue down the main corridor, Pathology is located on the left opposite outpatients.



Pathology Laboratory G

3.4. SITE MAP OF ORMSKIRK HOSPITAL

Pathology Department is located on the second floor. From the main entrance continue down the main corridor, Pathology is located on the second right. Click here to access site map on website.



Ormskirk Hospital Site Blood Sciences Essential Laboratory is located on the ground floor (Level 2). From the main entrance of Ormskirk Hospital, walk down the corridor and take the second right; the laboratory is located opposite the corridor from the Minor injuries Unit.

3.5. ABOUT PATHOLOGY SERVICE

The Pathology Laboratory Services is based at four sites, with the main hub sited at Whiston Hospital located in Nightingale House (see the Site Map on page 15). Blood Sciences, Mortuary and Bereavement services are also sited at Southport and Ormskirk Hospital (S&O) sites (please see pages 16/17).

Each year MWL Pathology performs 20 million tests which are dealt with by medical, scientific, clerical and support staff in 4 departments at the main Whiston Hospital hub and smaller essential labs at St Helens Hospital offering urgent haematology and coagulation service Monday, Thursday, and Friday mornings. Southport Hospital offering blood sciences and transfusion services 24/7 and Ormskirk Hospital offering sample reception service during selected times.

Biochemistry/Immunology **Haematology/Transfusion**

Microbiology/Andrology **Cellular Pathology**

Each department provides an up-to-date comprehensive range of diagnostic tests detailed in this handbook. The laboratory provides an efficient, high quality, cost effective, clinically based diagnostic service.

We participate in both national (external) and internal quality control schemes, with consistently high performance. All departments hold) accreditation to ISO15189 by peer reviewed assessment of the quality of our service by United Kingdom Accreditation Service (UKAS). Please refer to the schedule of accreditation for the tests covered by the standard. This is available on the UKAS website or by accessing the following link:

Click here – type Mersey and West Lancashire or Whiston or UKAS ID in the search box to call up certificate and schedule of accreditation for each of the departments below:

Biochemistry & Immunology- UKAS 8871

Cellular Pathology - UKAS 8908

Haematology & Transfusion - UKAS 8864

Microbiology - UKAS 8857

In addition to the main departments, Point of Care Testing (POCT) department are involved in overseeing the laboratory tests undertaken outside the laboratory area, within the acute Trust at Whiston, St Helens, Newton, Southport and Ormskirk Hospitals, under the direction of a Pathology based POCT Lead. See section 9 for further information.

The laboratories provide training for junior medical staff, Biomedical Scientists (BMS) and medical students. Medical and BMS staff actively participate in research and development, both internally and in conjunction with hospital colleagues. Pathology staff are all actively involved in audit in order to improve the quality of the service provided.

3.5.1. Feedback:

We value any comments from our services users, as this will help us to monitor and improve the service we offer. Please email the department on Pathology.Support@STHK.nhs.uk or alternatively contact the Pathology Quality Manager Rita.Mistry@STHK.nhs.uk. Please look out for our annual Survey distributed electronically or use the link below. For previous survey reports please contact the laboratory. Feedback can also be given via the Pathology Enquiries Form on the 'Pathology Services' page on both the MWL Website (for external users and patients) and on the 'Pathology Services – Contact Us' page on the MWL intranet page.

Link to Pathology Survey:

Link:https://docs.google.com/forms/d/e/1FAIpQLSeq6fs-Pa2n-FbUlpQqxcnddbYE2jTYSfJHfa_vJfVacfJd8w/viewform
Pathology webpage: Mersey and West Lancashire Teaching Hospitals NHS Trust STHK | Our Services

3.6. LAB TEST ONLINE – Information About Laboratory Test

Please use the link: http://labtestsonline.org.uk/ or click here

The website help you understand the many clinical laboratory tests that are used in diagnosis, monitoring and treatment of disease.

Any of the Whiston pathology departments can also be contacted directly for advice and information, see relevant sections below for contact details.

3.7. CONTACT NUMBERS

3.7.1. Key Personnel

For General Pathology Enquiries please email - **pathology.support@sthk.nhs.uk**

POSITION	TELEPHONE
Clinical Director/Consultant Chemical Pathologist	0151 430 **1833**
Pathology Manager	0151 290 **4122**
Administration Manager/PA to Clinical Director & Pathology Manager	0151 290 **4123**
Clinical Biochemist	**0151 290 4520** 0151 290 **4141** (Whiston) 0151 290 4539 (Southport)
Consultant Immunologist	Contact Consultant Chemical Pathologist or Clinical biochemist
Consultant Haematologists	0151 430 **1825** (Whiston) 01704 70 **5172** (Southport)
Biochemistry and Haematology Service Manager	0151 430 **1825** 0151 430 **1886**
Biochemistry Operations Manager	0151 290 4507

Haematology Operations Manager	0151 430 **2360**
S&O Pathology Site Manager and Reception Lead	01704 70 **4934/0151 290 4527**
Transfusion Operational Manager	0151 478 **7501**
Transfusion Coordinator/Practitioners Whiston/St Helens	0151 290 **4214**
Transfusion Practitioners Southport & Ormskirk	01704 70 **5175/4176**
Consultant Microbiologists	0151 290 **4123** (Whiston) 01704 70 **4717** (Southport)
Microbiology Service Manager	0151 290 **4140**
Consultant Histopathologists	0151 430 **1824**
Cellular Pathology Service Manager	0151 290 **4319**
Cellular Pathology Operations Manager	0151 430 **1916**
Cervical Screening Programme Lead/ admin support	0151 430 **1770**
Mortuary Service Whiston	0151 430 **1954**
Bereavement Service Whiston	0151 430 **1336**
Mortuary Southport **Mortuary Ormskirk** **Bereavement Services Southport**	01704 70 **4014** 01695 65 **6745** 01704 70 **4135**
Chief Phlebotomist Whiston/St Helens	0151 478 **7781**
Chief Phlebotomist Southport & Ormskirk	01704 70 **5174**
I.T. Co-ordinators	0151 430 **2365**
I.T. Contact Southport & Ormskirk	01695 65**6666 (S&O Trust IT)**
Point of Care Lead	0151 290 **4317** 01704 70 **4170**
Head of Quality Care Group	0151 290 **4215**
Pathology Quality Manager	0151 478 **7782**

3.7.2. Department Numbers – Whiston and St Helens hospitals

General Enquiries/Hotline	0151 430 **1826/1305**
Blood Science Results Line	0151 430 1822
Fax number	0151 430 **1823**
Pathology Reception	Ext 2087 (internal number only)
Transfusion Hotline	0151 430 **1584**
Biochemistry	0151 430 **1832**
Haematology	0151 430 **1838**
Coagulation	0151 430 **1838**
Transfusion	0151 430 **1584**
St Helens Laboratory (Haematology)	01744 64 **6079**
Cytology (Non Gynae)	Contact Histology department
Microbiology Specialist Trainees	0151 430 **5217/5117/5149**
Microbiology	0151 430 **1837**
Histopathology	0151 430**1828**
Specialist Registrar Histology	0151 290 **4124**
Mortuary Whiston	0151 430 **1954**
Bereavement Office Whiston	0151 430 **1336** or 0151 430 **1412**
Point of Care Team Whiston	0151 290 **4317**
Phlebotomy Whiston	0151 478 **7781**
Whiston and St Helens Hospital Switchboard	0151 426 **1600**
Southport and Ormskirk Hospital Switchboard	01704 54 **7471**

Please note:
Hospital Switchboard 0151 426 1600 and ask to be put through to the appropriate extension (last 4 digits). Calls from within Whiston or St Helens Hospitals: dial only the last 4 digits for numbers prefixed with 430 or 290.

3.7.3. Department Numbers – Southport & Ormskirk (S&O)

S&O Pathology Site Manager and Reception lead	01704 70 **4934** 0151 290 **4527**
General enquiries	01704 70 **4179** **01704 704677 Fax**
Secretaries (Consultant Haematologist)	01704 70 **5172**
Secretaries (Consultant Microbiologist)	01704 70 **4717**
Secretaries (Consultant Histology)	01704 70 **4676**
S&O Office Team Leader	01704 70 **4721**
Southport Lab Biochemistry	01704 70 **4172**
Southport Lab Haematology	01704 70 **4175**
Southport Lab Transfusion	01704 70 **4176**
Southport Lab Reception	01704 70 4098
Ormskirk Lab Reception	01695 65 **6236**
Ormskirk Haematology Lab	01695 65 **6232**
Ormskirk Transfusion Lab	01695 65 **6645**
Point of Care Team	01704 70 **4170** 0151 290 **4317 mobile 07342078105**
Mortuary S&O	01704 70 **4014** 01695 65 **6745**
Bereavement Office S&O	01704 70 **4135**
Phlebotomy S&O	01704 70 **5174**

3.8. PHLEBOTOMY SERVICES AT WHISTON AND ST HELENS HOSPITALS

3.8.1. Inpatients Phlebotomy Service

Phlebotomy services are provided for hospital inpatients daily in the morning at Whiston and Monday to Friday mornings at St Helens Hospital.

3.8.2. Hospital Outpatients

Services for hospital outpatients are provided on both sites:

Please note appointment system has been introduced commencing Autumn/Winter 2021, please refer to the Trust Webpage for Phlebotomy for the latest information, click here.

Appointments can be booked online: https://sthk.simplybook.cc/v2/ **(available 24/7)**
Or call 0808 **196 4500 (Booking available Monday to Friday 12pm to 3pm)**

Clinic	Monday - Friday
St Helens	08:00 – 19:40 (Monday only) 08:00 – 16.30 (Tuesday to Friday)
Whiston	07:00 – 16:35

No service at the weekends. Please note clinic times/services may vary, please check the Trust website for the latest information, click here.

3.8.3. Newton Community (OPD)

8.00 am – 11.00 am Monday – Friday.

3.8.4. General Practice

We are able to offer a limited booked service for patients requiring a Glucose Tolerance Test and anticipate that this service will also be offered within Primary Care.

3.8.5. Community Phlebotomy Service

For information on the existing phlebotomy community sessions please refer to the table below for the following available services:

Halton & St Helens CCG
Knowsley CCG
Whiston Community

3.8.6. Whiston Community Phlebotomy Service Clinics

Please note a new appointment system has been introduced commencing Autumn/Winter 2021. Please refer to the Trust Webpage for Phlebotomy, for the latest information, click here.

To book an appointment please visit
https://sthk.simplybook.cc/v2/ **(available 24/7)**
Or call 0808 **196 4500 (booking available Monday to Friday 12pm to 3pm)**

There are a number of Phlebotomy Services within Whiston and St Helens hospitals and also in the community. Phlebotomy service takes blood samples from patients aged 16 and over (for Lowe House and Garswood, patients need to be 18 and over) who have been referred to the service by their healthcare professional for a blood test.

GPs and other healthcare professionals refer patients to the service when they need a blood test to be taken. Below are the locations of the clinics.

St Helens Hospital Outpatient Department Orange Zone Marshalls Cross Road St Helens WA9 3DA	Monday & Tuesday: 8:00am to 7:40pm Wednesday – Friday: 8:00am to 4:30pm
Whiston Hospital Outpatient Department Yellow Zone Warrington Road Rainhill L35 5DR	Monday to Friday: 7:00am to 4:35pm
The Millennium Centre Urgent Treatment Centre Phlebotomy Clinic Corporation Street St Helens WA10 1HJ	Monday to Friday: 7:00 am to 8:50am Saturday: 8:05am to 11:25am
Newton Community Hospital Phlebotomy Clinic Bradleigh Road Newton-Le-Willows WA12 8RB	Monday to Friday: 8:00am to 11:00am
Lowe House Health Centre Phlebotomy Clinic Crab Street St Helens WA10 2DJ	Monday to Friday: 8:05am to 12:25pm* *A community and a Trust phlebotomy service operate from this site and both can be booked either online or by calling 0808 196 4500

Peelhouse Lane Plaza, 1 Peelhouse Lane, Widnes WA8 6TN	Bookable via the surgery for Peelhouse Lane Plaza patients only.
Garswood Medical Centre Phlebotomy Clinic Billinge Road Ashton-In-Makerfield WN4 0XD	Monday: 8:25am to 12:25pm
Haydock Medical Centre Woodside Medical Centre Woodside Road St Helens WA11 0NA	Wed: 08:05am – 12:25pm Thu: 08:05am – 12:25pm
Fir Park Medical Centre Lanark Gardens Widnes WA8 9DT	Bookable via the surgery for Fir Park Medical Centre patients only.
Bevan Group Practice Surgery Bevan Way Widnes WA8 6TR	Bookable via the surgery for Bevan Group Practice patients only.
Rainhill Clinic View Road Rainhill L35 0LE	Monday, Tuesday, Thursday, Friday: 9:15 am to 11:55pm
Rainford Health Centre Phlebotomy Clinic Higher Lane Rainford WA11 8AZ	Tuesday and Friday: 8:05am to 12:25pm
Widnes Health Care & Resource Centre Phlebotomy Clinic Oaks Place Caldwell Road Widnes WA8 7GD	Monday to Friday: 8:00am to 11:25am

For current information relating to Phlebotomy clinic information visit: click here.

3.9. PHLEBOTOMY SERVICES AT S&O

3.9.1. In patient S&O Phlebotomy

Phlebotomy services are provided for hospital inpatients daily in the morning Monday to Friday at Southport Hospital. Afternoon service is provided for the wards and a reduced service at the weekend and bank holidays.

3.9.2. Southport Hospital

Town Lane
Southport
PR8 6PN

This service operates from 09:00 – 16:00hrs Monday to Friday, closed bank holidays. It is for the use of hospital patients only – any blood tests requested by GP cannot routinely be taken, unless for a specialist test or by prior arrangement with the Phlebotomy Manager. Please note this service has now returned to a walk-in service.

3.9.3. Ormskirk Hospital

Wigan Road
Ormskirk
L39 2AZ

This service operates from 08:30 - 11:30hrs Monday, Tuesday, Thursday, Friday, closed Wednesday and bank holidays. Please note this service has now returned to a walk-in service.

Please note Ormskirk Hospital Blood Clinic will operate an appointment system from 1st December 2024. To book an appointment please visit:
https://sthk.simplybook.cc/v2/ **(available 24/7)**
Or call 0808 **196 4500 (booking available Monday to Friday 12pm to 3pm)**

3.9.4. Specialised Paediatric Phlebotomy

Specialised **paediatric services** are available for children under 16 years of age at the following locations - by appointment only:

- Ormskirk Childrens ward,
  - Mon, Tues, Fri – 8:10 – 8:40
  - Wed – 1:30pm – 4pm.
  - Please call **01695 656317** to arrange an appointment.

- The Village Surgery, Formby Childrens clinic on Tuesday 08.30 – 12.00 hrs.
  Elbow Lane, Liverpool L37 4AW
  Telephone 01704 835159

3.10. GP COLLECTION SERVICE

3.10.1. St Helens and Knowsley

Practices using our services have a specimen collection and printed report delivery each weekday. Blood test and microbiology reports are transmitted electronically at 6:30 am, 12 noon and thereafter every half hour until 6:30 pm. Cervical cytology reports are sent electronically to all practices on request. Histopathology reports are not transmitted

electronically. If you would like to stop receiving paper reports in your surgery, then please contact pathology.support@sthk.nhs.uk

3.10.2. Southport and Ormskirk

GP collection and deliveries are organised by Southport and Ormskirk Trust, please contact Transport and Logistics manager for further information on 01695 656598.

3.11. PATHOLOGY OPENING HOURS

See pages 2-3 of this user guide.

General Enquires: pathology.support@sthk.nhs.uk

3.12. ROUTINE RECEPTION OPENING HOURS

3.12.1. Whiston

Pathology Reception at Whiston Hospital is open 24hrs per day all year.

3.12.2. Southport and Ormskirk

Southport & Formby District General Hospital, Town Lane, Southport, Merseyside, PR8 6PN
This site offers services in Biochemistry, Haematology and Blood Transfusion

Specimen Reception	
Monday – Friday	09:00 - 17:30
Service availability: Biochemistry, Haematology and Blood Transfusion	
Monday - Sunday (including Bank Holidays)	24 hour analytical & clinical service

Ormskirk & District General Hospital, Wigan Road, Ormskirk, L39 2AZ
This site operates an Essential Services Laboratory: Haematology, Transfusion and Sample reception.

Specimen Reception	
Monday – Friday	08.30 - 17:00
Weekends and Bank Holidays	09:00 - 14:00
Service availability: Haematology and Blood Transfusion	
Monday – Friday	09:00 - 16:30hrs
Weekends and Bank Holidays	All work is sent to Southport.

ODGH site offers limited on-site testing including some Haematology and urgent Transfusion. All other work is transported on scheduled transport to SDGH or Whiston site to process. Out of hours all samples should be taken to the main porter's desk. Please try and drop off samples at least 10 minutes before scheduled transport runs (see section 3.15.2 for transport run times)

3.12.3. Out of hours requests at ODGH

When samples need to be sent to the laboratory out of hours from Ormskirk, please contact the porter on ext. 6153 or ascom 3751. The porters will collect and transport the samples on the appropriate transport method.

3.13. URGENT REQUESTS

PLEASE NOTE: It is the requestor's responsibility to ensure the request form is completed correctly with both patient details and with the correct details of the requesting clinician and requestor location. This is to ensure results can be reported without delay either electronically and/or phone through to appropriate contact if the results trigger our action limits for phoning. If service user location is not open 24/7 and results have not been returned, it is the requestor's responsibility to make suitable arrangements for receipt of any urgent or critical results. If applicable escalate any outstanding results not received within normal timeframe.

Urgent requests must be signed in at the laboratory reception on the Urgent Specimens Sign in Form and given to a receptionist to countersign. Unusual or exceptional requests are facilitated by telephone discussion with the appropriate laboratory staff.

For urgent GP requests, GPs must ring the laboratory ahead, for any urgent samples to be processed in order for these to be noted on the Urgent Sign in form.

For urgent **Community requests** when hand delivered, must be signed in at laboratory reception on the Urgent Specimens Sign in Form and given to a receptionist to countersign. If samples are sent in with routine transport the laboratory must be contacted in advance.

Urgent requests for cross-matching blood must be telephoned to transfusion and samples delivered straight to the Transfusion Department for checking.

Microbiology should be notified of all URGENT / precious samples being requested e.g. CSF's samples. The department try to process all samples promptly on a 24/7 basis, to avoid delays created by Urgent samples entering the normal flow of routine samples please notify when sending or if expected results are not available.

Please contact Microbiology on 1652 or from Southport/Ormskirk speed dial # 6406

3.14. TRANSPORT TO THE LABORATORY

3.14.1. Packaging

All samples, e.g. blood, faeces, urine, swabs etc., are potential infection hazards. Always ensure that the sample container is tightly sealed to avoid leakage in transit. Place the container in the plastic bag attached to the request form and seal the bag carefully. This will ensure that in the event of breakage or spillage the infection risk to staff is minimised. Never place the request form in the plastic bag with the sample.

Samples transported between sites should comply with Packaging and transport requirements for patient samples – UN3373 of samples to the laboratory will include the use appropriate UN3373 compliant transport boxes for the samples to be placed that the samples shall be placed in before they are transported.

Please refer to the following polices on the **Trust intranet**:

Please click here to view Trust's Transport Policy STHK0437 Transportation of Specimens Procedure
Transport of biohazards in personal vehicles policy - Infection Prevention Manual Chapter 32 click here
Please also refer to the STHK Trust policy for STHK0176 Use and Safe Handling of a Formaldehyde Solutions Policy click here for transportation of samples in formalin

3.14.2. Transport

Samples should normally be transported to the laboratory without delay, unless it is appropriate to store them in a safe manner. Urine samples for culture, for example, should be stored in a refrigerator if there is a delay in transport.

All Histology and Cytology samples from St Helens DTC are transported to Pathology in either a small grey/blue transport bag (clinics) or a large green transport bag (theatres). The specimen books must also be sent with the samples.

Specimens may be transported to the laboratory using the pneumatic tube system (Air Tube). Please refer to the Trust Policy – 'Air Tube System' for information relating to the appropriate use of this system in respect to samples. Please ensure you have been trained to use the Air Tube prior to use.

The following samples **MUST NOT** be transported via the Air Tube system: -

- CSF samples
- High Risk Samples: e.g. samples from patients with Rural African Risks (Viral haemorrhagic fever), suspected CJD, Anthrax or multi drug resistant TB.
- Transfusion blood and blood products.
- Clinical waste, including empty blood bags.
- Any Histology samples.
- Frozen sections for Histology.
- Cytology samples.
- Items over 1.0 Kg (if in doubt, do not send).
- Flammable substances.
- Any sharps.
- Samples on ICE.
- Any samples packaged with ICE.

3.15. TRANSPORT PICK UP AND DROP OFF

3.15.1. Whiston and St Helens

GP samples are dropped off twice a day. Please contact Portering manager for further detail 0151 430 **1395.**

Samples arriving from St Helens and transported via the shuttle drivers between the two sites that run every 20 minutes during the routine day.

Please see individual department information for details of special transport requirements such as samples to be sent on ice.

ERS Medical (based in Speke)
03332404045 email: spekcourier@ersmedical.co.uk

Two runs per day between Whiston and Warrington.
Transport leaves Warrington laboratories at 09:15 am and 01:15 pm.
Also, two runs a week Tuesday and Friday am from Hanover Unit Wrightington Wigan & Leigh.

3.15.2. Southport and Ormskirk (S&O)

Pick up/Drop off Transport Schedule for Pathology Southport/Ormskirk/Whiston

Please may we ask that all Pathology Samples including Covid samples are sent to the lab as soon as they collected i.e. within 15 minutes 24/7, 7 days a week.

Please note that the transport runs are periodically reviewed and may be subject to change to meet the requirements of the service.

Weekdays		
Transport to Whiston **Transport times for samples to be analysed at Whiston (Microbiology samples, including Covid, Blood Culture and CSFs).**		**Transport to Southport**
Southport pickup times to Whiston	**Ormskirk pickup times to Whiston**	**Ormskirk to Southport**
09.15hrs Direct	09.45 hrs	09.00 hrs
09.45 hrs via Ormskirk	11.00 hrs	11:00 hrs
11:15 hrs via Ormskirk	13.00 hrs	13:00 hrs
12.15 hrs via Ormskirk	14.30 hrs	15.00 hrs
14.00 hrs via Ormskirk	15.30 hrs	-
15.00 hrs Direct	-	-
18.00 hrs Direct	19.30 hrs	19.30 hrs
20.00 hrs Direct	22.00 hrs	22.00 hrs
22.30 hrs Direct	00.00 hrs	00.00 hrs
00.30 hrs Direct	02.00 **hrs**	02.00 **hrs**
02.30 **hrs** Direct	04.00 hrs	04.00 hrs
04.30 hrs Direct	06.00 hrs	06.00 hrs
06.30 hrs Direct		
Weekends and Bank Holidays		
Southport pickup times		**Ormskirk to Southport**
09.00 hrs		10.30 hrs
11.00 hrs		14.00 hrs
13.00 hrs		16.30 hrs
14.30 hrs		22.00 hrs
17.00 hrs		00.00 hrs
22.30 hrs		02.00 **hrs**
00.30 hrs		04.00 hrs
02.30 **hrs**		06.00 hrs
04.30 hrs		
06.30 hrs		

FOR QUERIES WITH WHISTON RUNS PLEASE CONTACT MEDIREST ON: - 0151 430 2317/ 1964

3.15.3. S&O Transport Out of Hours – URGENT

When samples need to be sent to the laboratory out of hours from Ormskirk please contact the porters regarding arranging collection and transport of samples. The porters will collect, and transport the samples on the appropriate transport method, with no need to ring Southport laboratory. Please call ext 6153 or Ascom 3751 Ormskirk.

3.15.4. Cytogenetic Samples

DO NOT PLACE IN FORMALIN

TISSUE FOR CYTOGENETIC STUDIES MUST BE PLACED INTO TRANSPORT MEDIUM SUPPLIED BY CYTOGENETICS DEPT IMMEDIATELY OR PLACED IN A STERILE UNIVERSAL AND STORED IN A REFRIGERATOR.

The Histopathology Department does not process these samples, but they will be delivered to the Liverpool Women's Hospital via hospital transport daily at midday. Specimens must be delivered to Pathology Specimen Reception in the morning, Monday to Friday, where a signature will be obtained.

DO NOT LEAVE A SPECIMEN RECEPTION WITHOUT ALERTING A MEMBER OF STAFF.

3.16. ACCESS TO PATHOLOGY RESULTS

Results of completed and authorised tests are available via ward terminals on Careflow within the acute Trust, (results at S&O are available on Careflow/Indigo Review), and via ICE within the community/GP Practices. Telephone enquiries for results will not be accepted from these departments. The method to obtain results is outlined in section 3.26.

3.16.1. Whiston Pathology Hotline

0151 430 **1826** (the Pathology Hotline is available 24 hours a day 7 days a week)

If an **Emergency Crossmatch** is required, you **MUST** contact the Blood Transfusion Department directly.

3.16.2. Transfusion Hotline

0151 430 **1584** (the Transfusion Hotline is available 24 hours a day 7 days a week)

Full cross match **45 minutes,** Uncross matched **15 minutes.** Electronic Issue **5 minutes –** times are dependent on complexity and volume of workload.

3.16.3. S&O Blood Sciences Hotline

For results: please check on Careflow/Indigo Review first

All Blood Science S&O result enquiries*: **01704 70 4179 (Mon – Friday 09.00 – 17.00 hrs)**

***FOR ALL TRANSFUSION REQUESTS 24 HOURS CONTACT:** 01704 70 **4176**

3.17. REQUESTING PATHOLOGY TESTS

3.17.1. Whiston & St Helens

Hospital requests are made via Careflow. Any guidance and online Careflow training on Moodle is available by contacting the IT department.

Community requests are made using ICE, for which training was provided by St Helens & Knowsley IT department upon installation. For further advice please contact pathology.support@sthk.nhs.uk

In the event of CAREFLOW/ICE not being available then requests shall be made using the paper request form.

3.17.2. S&O

Hospital requests are made by completing an electronic request on Careflow or Pathology request form. GPs request are made by using ICE, for which training is provided by St Helens & Knowsley IT department upon installation. (Paper request forms are still accepted). For further advice please contact pathology.support@sthk.nhs.uk.

3.18. MINIMUM REQUIREMENTS FOR ACCEPTANCE OF SAMPLES

In the interests of patient safety and compliance with Clinical Governance there is a separate policy, available on the intranet, for the minimum criteria for request form and sample acceptance. This is designed to ensure that each patient is positively identified before collection of the sample and that results are provided for the right patient in a timely manner.

3.18.1. Request Form Completion

WHETHER ELECTRONIC OR HANDWRITTEN MUST BE COMPLETED WITH THREE IDENTIFIERS ON BOTH SAMPLES AND REQUEST FORMS. REQUIRED IDENTIFIERS ARE:

Required Identifiers are:

1. **First and Last Name**
2. **Date of Birth**
3. **NHS Number and/or Hospital Number**

If NHS number or hospital number is not available address may be used as the 3rd identifier.

- The name of Consultant, location for report, signature of requestor and tests required must also be indicated.
- It is essential to include relevant clinical details for the correct interpretation of results and to perform further tests based on the results. For Microbiology requests, details of current or recent antimicrobial treatment must also be provided.
- **Date and time of sample collection**. This is a requirement for Pathology and provides important information around sample quality.
- Addressograph labels can be used for request forms but **not** on samples.
- Please affix identification labels to all layers of the forms.
- Transfusion forms must be signed by the Medical Officer or authorised Midwife/Nurse who has received specific training in transfusion.
- the identity of the person collecting the primary sample should be recorded

See section 6.7 for Transfusion request form and sample specific requirements.

REQUEST FORMS

Blood Science forms are black and white. One side of the form is for CAREFLOW requests providing space for 4 CAREFLOW labels. On the reverse is a template to handwrite a request form.

Request forms for General Practitioner use are combined for BIOCHEMISTRY, HAEMATOLOGY AND MICROBIOLOGY (for handwritten requests) or an A4 ICE generic pathology request form can be used. GYNAECOLOGICAL (cervical LBC) requests can be made using the HMR101 green form for handwritten requests or an A4 ICE generic pathology request form can be used.

Blood Transfusion forms are red in colour and must be filled in as described in section above.

3.18.2. Sample Preparation

Samples received in Pathology can be:

- **Handwritten**
- **Order Comms System (hospital)** labelled with an ID label produced via system
- **Sunquest ICE Order Communications** labelled with an ID label produced via system for GP and community only
- **Blood track** labels produced directly from the wristband
- **Emergency Department** blood tube label

Handwritten samples must be completed with same as on the request form as follows:

Full Name
Date of Birth
***** 3rd patient identifier will be required on samples to match request form from 1st of May 2019.**

If NHS number or hospital number is not available address may be used as the 3rd identifier.
In addition the date and time of sample collection should be included.

If requests are received with just two identifiers on either the request form or the sample then they will be rejected.

Samples identified with printed labels must comply with the following:

- Contain a minimum of three of the identifiers present on the request form
- **All labelling must be done at the patient's side**
- **Addressograph labels are NOT acceptable on blood tubes**

Pathology staff are unable to accept inadequately completed forms or samples for testing. It is rare but on occasions we do not process such samples, which results in a delay to the patient's treatment or the patient needing to provide another sample.

For Special labelling requirement of Transfusion Samples refer to section 6.7.

For specific request and labelling requirements for antenatal samples:

- **For antenatal samples for infectious diseases in pregnancy screening (IDPS) see section 7.21.1**
- **For antenatal samples for Sickle Cell and Thalassemia Screening please see section: 5.11**

3.18.3. No Location No Clinician Details Provided on Pathology Request

We receive some 400 request each month where we are not provided with details of the ordering Clinician and/or location to which the report should be issued. In those instances, the Pathology department will hold the results on file for 30 years. Any results that fall into our category for actioning we shall endeavour to try and best locate the patient's clinician/GP and phone the results back to them. Please note there will be results that fall outside reference range but will not be phoned. It is the responsibility of the requesting clinician to provide sufficient details on the request form to ensure the laboratory is then able to report the results back to the correct requesting clinician.

3.19. CRITERIA FOR REJECTION OF PATHOLOGY SAMPLES

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

- Unlabelled and incorrectly labelled samples will be rejected see above for the minimum labelling requirement for all samples. For precious and urgent samples, efforts will be made to contact the requestor, for them to have the opportunity to label samples – responsibility of the patient being correctly identified remain the responsibility of the requestor (except Transfusion forms and samples - amendment to original sample NOT allowed).
- Request form minimum requirement must be met see above, otherwise sample will be rejected. For precious and urgent samples, efforts will be made to contact the requestor for them to complete the request form (except Transfusion forms and samples – amendment to original sample NOT allowed).
- 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 as per recommended protocol e.g. on ice, fasting etc
- Sample not collected as per recommended testing interval see section 3.6
- Spurious results due to inappropriate collection.
- If 2 requests for different patients are placed on one request form (CAREFLOW)
- Leaked samples
- Out of date sample containers
- For Histology Samples, if clinical details incomplete or missing, at the Pathologist discretion the requestor may be contacted to provide this detail, samples would then be returned to requestor for the clinical details to be provided before sample will be accepted for analysis.
- Product of Conception Samples with incomplete or missing consent form 10, requestor will be contacted, and samples return for completion of consent forms.

3.19.1. Precious Sample

In exceptional circumstances samples may be accepted for processing that have not met our acceptance criteria, and in the best interest of patient care and management, please contact the laboratory for further information. Please note it will be the clinical team's responsibility to accept the risk associated with processing such samples.

3.20. SAMPLE COLLECTION

Always ensure that the specimen is placed in the correct container and clearly labelled. See the appropriate department sections for lists of containers to be used for the various tests. When in doubt, contact the laboratory for advice or view using the Intranet.

3.20.1. Storage of Samples Prior to Transport to Laboratory

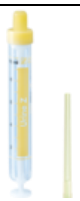
The correct pre-analytical storage of pathology specimens is essential for the production of valid test results. For example, serum potassium levels can be artificially raised if the specimen is stored in a refrigerator, whilst some specimens must not be stored but immediately delivered to the laboratory.

Specimens which can be stored at room temperature, should be stored away from direct light or heat source e.g. radiator and extremes of temperature.

Specimens that have to be refrigerated should be stored between 4°C and 8°C whilst awaiting collection.

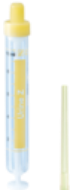
Please see below for the appropriate storage conditions and time limits for different samples awaiting transport to the laboratory. If further information is required and not available in this handbook please contact the relevant department for advice or email Pathology.Support@sthk.nhs.uk

Please note the Microbiology Department is open 24/7, and therefore where possible samples should be sent to the lab as soon as possible. Many Microbiology tests have a defined period of incubation and sooner the sample is received sooner the process can begin and results made available.

Sample Storage Guidance Prior To Transportation to Laboratory		
Profile or Test	**Sample Storage**	**Sample Required**
Biochemistry		
Routine Biochemistry Profiles.	**Do NOT store in the fridge - send to lab within 4 hours.** Keep at room temperature, potassium will be falsely elevated if samples stored in refrigerator. Samples should be stored at room temperature prior to transportation to lab.	 **Brown** GEL 4.9 ml
Blood Glucose	May store whole blood in refrigerator overnight.	 **Yellow** 2.7 ml
Cerebral Spinal Fluid (CSF)	**Do Not Store** - Send to lab without delay.	Plain Universal (Glucose bottle for CSF glucose)
Special Biochemistry Tests	Please refer to section 2.11	
Random Urine Biochemistry Tests (Micro albumin, urine protein and urine creatinine)	Okay to store at room temperature awaiting transportation. Store overnight in the refrigerator.	 **Yellow** 10 ml
24 Urine Samples	If possible keep refrigerate.	Acid or Plain 24 Urine containers
Faeces (calprotectin)	Refrigerate if possible	Brown faecal pots (can accept blue faecal pots

		or white top universal container) 
FIT testing	Refrigerate if possible	FIT sample bottle 
Haematology /Transfusion		
Full Blood Count Differential White Count Blood film Reticulocytes Sickle Cell Screen/Haemoglobinopathies ESR	Okay to store at room temperature awaiting transportation. Store overnight in the refrigerator. (Please note sample integrity may be affected for some parameters when samples stored overnight.) Clotted samples unsuitable for testing. Flow Cytometry (cell markers) not available overnight or at weekends and must not be kept in the fridge.	 **Red** 2.7 ml (EDTA)
Malaria Cell markers, CD4	**Do NOT store – Send as soon as possible.**	 **Red** 2.7 ml (EDTA)
Special Haematology Tests	Please refer to section 5.	

Coagulation tests including D dimer	**Do NOT store - send to lab within 4 hours.** Coagulation factors deteriorate rapidly and some factors are affected by cold storage. **Under filled and Overfilled samples are unsuitable for testing.** Arrow on label indicates fill level and acceptable tolerance. Clotted or haemolysed samples cannot be processed. **See Section 5 for more detail**	 **Green** 3.0 ml (citrate)
Special Coagulation (Including Anti – Xa/Heparin)	As above. Also note Special Coagulation must be received in the lab withing 1 hour of collection, please arrange for patient to attend onsite Phlebotomy clinic at Whiston hospital see section 3.8.2 or Southport hospital 3.9.2.	 **Green** 3.0 ml
Transfusion	May store whole blood in refrigerator overnight. Grossly Haemolysed or very small samples will be rejected. Refer to section 6.4 for labelling criteria for transfusion samples.	 **Blue** 7.5 ml (EDTA)
Transfusion (Infants <4 months old for Transfusion Group and Coombs tests.)	May store whole blood in refrigerator overnight. Grossly Haemolysed or very small samples will be rejected. Refer to section 6.4 for labelling criteria for transfusion samples.	 **Blue** 1.6 ml (EDTA)
Microbiology		
Urine Culture and Sensitivity	Refrigeration is preferable. May store at room temperature or refrigerated. (The lab is open 24 hours and samples should be transported to the lab as soon as possible to allow prompt analysis and reporting)	 10 ml Boric Acid

Urine TB Culture	Refrigeration is preferable. May store at room temperature or refrigerated. (The lab is open 24 hours and samples should be transported to the lab as soon as possible to allow prompt analysis and reporting)	 250 ml container available from the lab
Faeces (Routine Microbiology)	Refrigerate if there is a delay in transportation to the lab.	 Brown Faecal Pots (Can accept blue faecal pots)
Blood Cultures	Samples should be transported to the lab as soon as possible. (The microbiology department is open 24/7, and often tests require a defined period of incubation to allow prompt analysis and reporting)	Biomerieux Culture Bottles
CSF	Transport without delay.	Sterile Universal Pot (Use special CSF collection package for collection and transport of samples) see section 4.4.2
Fluid Samples	Should be refrigerated if transport is delayed.	 Yellow no preservative 10 ml urine container.
Fluid (Prosthetic Joint Fluid) (Culture and Cell Count)	Transport without delay	Lithium Heparin Orange top bottle  And Universal Pot
Serology	Can be stored overnight in the refrigerator	 **Brown** GEL 4.9 ml
Swabs for Bacterial Culture	Can be stored at room temperature	Blue Top Swab

	See section 7	
Swabs for Virology	Can be stored at room temperature. See section 7	Must be transported in virus transport medium
Special Microbiology	Please refer to section 7	
Cellular Pathology		
Tissue samples in formalin	Can be stored at room temperature. (*dry tissue samples and frozen sections require special handling, see section 8)*	Formalin pots.
Samples collected in CytoRich Red Containers	Should be stored at room temperature prior to transportation to laboratory.	Obtain CytoRich Containers from Laboratory.
Other Cytology Fluid Samples	Please refer to section 8.	

3.20.2. Adult Bloods

Generic Blood Bottle Description	SARSTEDT
Biochemistry/Viral Serology/Microbiology	**Brown** GEL 4.9 ml
Glucose Bottle Biochemistry	**Yellow** 2.7 ml
FBC bottle Haematology	**Red** 2.7 ml
Coagulation	**Green** 3.0 ml
Coagulation Special	**Green** 10.0 ml
Blood Transfusion Viral/Micro PCR	**Blue** 7.5 ml
Antenatal Bloods	**Blue** 7.5 ml

Biochemistry Specials	**Orange** 5.5 ml

3.20.3. Paediatric Bloods

Smaller volume colour coded bottles as above are supplied for paediatric use. Please use separate yellow blood bottles when requesting glucose. Paediatric bottles must not be used routinely for adult samples.

3.20.4. Minimum Volume Required for Paediatric Blood

Please use the following table as a guide. Whole blood samples for biochemistry tests have to be centrifuged to extract serum/plasma and the volume extracted can vary depending on sample's haematocrit levels.

Combination of tests will require more blood. For specialist tests that are sent way to referral labs please contact duty biochemist or relevant department for further advice.

Tests	Whole Blood	Serum/Plasma
Routine Biochemistry (UEs, CRP, SBR, LFT, Bone)	0.5 - 0.75 mls	0.15 -0.25 mls
Gentamycin or Vancomycin	0.5 mls	0.1 mls
SBR (serum bilirubin)	0.5 mls	0.15 mls
TFT	0.5 – 0.75 mls	0.25 mls
FBCs	0.5mls	-

PLEASE NOTE: transfusion will accept a paediatric 2.7ml EDTA red top sample with a minimum volume of 1ml of blood. For infants < 4 months use blue top EDTA bottle.

3.20.5. Other Sample Containers

Containers	Common name	Main use
30 ml clear plastic sterile	Universal	CSF, Urine BJP, Urine Amino Acids, Organic Acid, Cytology and microbiology Body Fluids e.g. pus, joint fluids
30ml or 60 ml clear plastic sterile	Sputum pot	Sputum
10ml Urine yellow MonovetteTube	Yellow Urine tube	For all other Biochemistry, Urine and fluid tests
10ml boric acid green Monovette	Green Urine tube	Urine Microbiology tests
30 ml blue/brown top	Faeces container	Faeces

3.21. HIGH RISK SPECIMENS

USE OF THE AIRTUBE IS COUNTER - INDICATED FOR THESE SPECIMENS.

These include all specimens from patients with known or suspected carriage of Hepatitis A, B, C or HIV. It also includes sputum specimens from patients with known or suspected pulmonary tuberculosis and cerebrospinal fluid

(CSF) from patients with confirmed or suspected Creutzfeldt Jacob disease (CJD), specimens from suspected anthrax cases, suspected viral haemorrhagic fevers.

To help identify these samples to pathology staff MUST affix **"DANGER OF INFECTION"** stickers on both the request form (all layers) and the specimen. Stickers must be used for every request and on all specimens from high-risk patients.

3.22. ADD-ON TESTS FOR SAMPLE ALREADY IN LABORATORY

Please do not ring the laboratory to request further tests. Users can request 'add on' test in Careflow, and thereafter select the tests required for adding on when prompted. Note for Biochemistry Department, specimens are kept for a minimum of 48 hours after final report has been issued by the laboratory. Samples for Haematology are kept for a minimum of 24 hours after final report has been issued by the laboratory. Serology samples are stored for 2 years, contact serology staff on ext. 1695 for any additional requests. A request form is required for add-on requests for HIV.

For guidelines for sample stability, please refer to the tables below:

3.23. GUIDE TO ADD-ON TEST STABILITY (for samples already centrifuged)

Note: Table 1 below is a guide to the maximum sample age for which "add-on" test requests can safely be accepted without prior discussion with a senior member of staff (Clinical Biochemist 0151 290 4520 or Consultant 0151 430 **1833** and will not present a risk to the patient. Clinical circumstances may arise where tests may be added on outside these limits, but only after discussion with a senior member of staff. Any test not included in table 1 below must be approved by a senior member of staff before analysis. For Chemistry tests the stability data quoted assumes that samples were promptly centrifuged after collection and have been stored refrigerated

Note: Any add on requests for serology tests must NOT be added to a biochemistry sample. Please refer the add on requests to Microbiology department.

3.23.1. Table 1: Biochemistry Add-On Tests Sample stability

Add-on test availability is dependent upon test stability and the storage time and condition of the original sample. Please note samples are stored normally for a minimum of 48hrs and therefore please use the tables below as a guide to the suitability for requesting add-on requests. (Tables in this section were updated September 2021.)

Tests COMMON TESTS HIGHLIGHTED BLUE	Maximum age for analysis of separated serum samples stored at 2-8C Tubes with gel (brown top)
aTPO	2 days
17-OHP	2 days
ACE	7 days
ACTH	Must be separated immediately upon receipt and frozen
AFP	2 days
Albumin	3 days
Aldosterone	7 days
ALP-Alkaline phosphatase	7 days
ALP isoenzymes	7 days
Alpha 1-antitrypsin	7 days
Amylase	8 days
Androstenedione	1 day
AST	7 days
Bicarbonate[1]	1 hour for uncapped [1] 24hrs at room temp capped [1] 3 days
Bile acids	7 days
Bilirubin[1]	1 day[1]
C3 / C4	3 days
CA 19-9	2 days
CA-125	1 days
CA-153	2 days
Calcium	2 days
Carbamazepine	2 days
CEA	2 days
Chloride	7 days
CK	5 days (4hrs at room temperature)
Cortisol	2 days
C-peptide	Must be separated immediately upon receipt and frozen
CRP	3 days
DHEAS	1 day
Digoxin	2 days
Down's Syndrome screen	6 days
Ethanol	14 days
Ferritin[4]	5 days[4]
Folate[4]	4 days[4]
FSH / LH	2 days

FT3/FT4	2 days
Gastrin	1 day
Gentamicin	2 days
GGT	7 days
Glucose	3 days (yellow top only)
Growth Hormone	1 day
Haptoglobin	3 days[5]
HbA1c	5 days (yellow/red top only)
HCG	2 days
Immunoglobulins	7 days
Insulin	Must be separated immediately upon receipt and frozen
Iron Studies[4]	5 days (ferritin least stable)
LDH	4 days
LFT	3 days (Bilirubin only 1 day, NA Bili if > 1 day. Albumin most unstable)
Lipids	2 days (Cholesterol most unstable)
Lithium	7 days
Magnesium	7 days
NT ProBNP	8 days
Oestradiol	2 days
Osmolality (serum and Urine)[2]	72 hrs[2] (3 hrs at room temp)[1]
Paracetamol[1]	14 days[1]
Phosphate[1]	4 days[1]
Procalcitonin	2 days
Progesterone	2 days
Prolactin	2 days
PSA	2 days
PTH[3]	48 hrs[3]
Renin	Must be separated immediately upon receipt and frozen
Salicylate	14 days
Serum Free Light Chains (SFLC)[6]	5 days
SHBG	6 days
Testosterone	7 days
Theophylline	7 days
Total Protein	3 days
Transferrin	7 days
Triglycerides	7 days
Troponin I (TNIH)	1 day
TSH	2 days
U&E	7 days
Urate/Uric Acid	5 days
Valproate	2 days
Vancomycin	2 days
Vitamin B12	2 days
Vitamin D	7 days
Zinc[1]	14 days[1]

3.23.2. Table 2: Immunology Add-On Stability

Tests	Maximum age of samples for analysis
Allergy testing	7 days
Auto Antibody Screening/ANCA	7 days
Immunology specialist assays	Discuss directly with laboratory technical staff
ATTG	7 days
Rheumatoid Factor	7 days

Note: A test may be added on beyond the stability quoted in this document at the clinical team's approval in conjunction with viewing individual test stability data for the specific method and equipment to be used.

3.24. SPECIMENS FROM STAFF

These must be sent via the GP or Health, Work and Wellbeing so that a doctor can be readily contacted with the results. Members of staff must not view their own test results.

3.25. REPORTS DELIVERED TO WARDS

3.25.1. Whiston Hospital

There is one delivery of reports to the wards every day (Monday – Friday) leaving the laboratory at 14:00hrs.

3.25.2. St Helens Hospital

Reports are delivered to the wards at 11:30hrs and 16:30hrs (Monday-Friday) and noon on Saturday.

3.25.3. Southport and Ormskirk Hospital

Reports are collected from Pathology daily at 16:30hrs for distribution to wards by the Trust's porters.

REMOTE ENQUIRY FOR PATHOLOGY RESULTS

Results of authorised completed samples will not be given out over the telephone routinely. It is the ward's responsibility to ensure that it has adequate staff coverage that are able to access the pathology results via the Trust's Careflow or Pathology Laboratory Computer System Telepath (limited access given) or Southport and Ormskirk NHS Trust's Careflow/Indigo Review, 24 hours a day.

3.25.4. Registration and Data Protection

Only staff who require access to results as part of their role are entitled to have access to hospital and Pathology IT systems.

3.25.5. Access to CAREFLOW (St Helens & Whiston)

Please contact the Trust's IT Training department: IT.Training@sthk.nhs.uk Tel: 0151 430 1173

3.25.6. Access to Pathology IT System Telepath

An application form must be completed by the individual, signed by the ward manager and submitted to Pathology: pathology.support@sthk.nhs.uk

3.25.7. Access to ICE

Please email ICE admin: Ice@sthk.nhs.uk

3.25.8. Access to ICNET

Please contact Infection Prevention Team: InfectionPrevention@sthk.nhs.uk

3.25.9. Access to Careflow or Indigo Review at Southport and Ormskirk NHS Trust

Line managers must submit applications for access to result on Careflow or Pathology Indigo Review to the Trust's IT department.

3.25.10. ICE Desktop GP order Communications solution

The GP Order Communications ICE System integrates with your GP Clinical Systems. Staff at the surgery now has the ability to generate an electronic request which the laboratory can process once in receipt of the specimen.

You can view and print your patient reports or "download" reports directly into your GP Clinical System.

This functionality is in addition to GP reporting system which is provided by the laboratory to distribute an electronic report directly into your GP Clinical System from your referral.

3.25.11. Access to Pathology Results – Careflow/ Indigo Review (Southport and Ormskirk Hospital)

Pathology Results are available on Careflow and Indigo Review.
Some historical and Transfusion result may only be available on Indigo Review, please contact the laboratory if you unable to access the results you require.
Access to Careflow and Indigo Review is available on S&O Intranet.
To access Indigo Review User guide, please see Pathology Webpage, under section "other"
Click here to access Pathology Webpage.

3.26. TELEPHONED RESULTS

There is a separate policy available on the intranet that details the requirements for telephoned results. Due to the risk of transcription errors, telephoned results are kept to a minimum. Results that fall outside limits set by the Consultant Pathologists in each discipline will be telephoned and ACTION must be taken to ensure patient safety. ALL telephoned results must be entered into the patient's notes as a timed, dated and signed entry. Please see the latest version of the *Policy for Actioning of Pathology Results Communicated by Telephone* on the Trust intranet. Click here

3.27. PROTECTION OF PERSONAL INFORMATION & CONSENT

Pathology staff are subject to the following Trust policies with respect to the protection of personal information:

- Staff Code of Confidentiality Policy
- Information Governance Policy
- Records Management Policy

Consent: any requirements for patient consent (e.g., consent to disclose clinical information and family history to relevant healthcare professionals, where referral is needed) or the use of human tissue (including blood samples and other bodily fluids) that has been provided for testing and subsequently requested by the Pathology Department for research and education purposes is covered by the Trust's Consent Policy.

3.27.1. Consent for testing

Informed consent for the venepuncture procedure and the testing of samples taken is required. For patients attending our Phlebotomy Clinics consent is assumed by them presenting themselves to Phlebotomy with a request form and then presenting their arm for venepuncture.

For patients that are in a hospital bed consent for the procedure is verbally checked by the phlebotomist before they are bled. They have an opportunity to refuse the procedure. For those who are unable to consent, i.e. are unconscious the decision to bleed and complete the relevant testing is taken by the clinical team in the best interests of the patient.

Consent for specialist tests will form part of the requesting procedure or taken by the clinician or healthcare profession requesting the test and is inferred to the laboratory.

Please also refer to sections:
4.10 - consent for sweat testing
6.5 - consent for Blood Transfusion
5.12 - consent for Haemoglobinopathies and genetics testing
5.16 - consent for antenatal Sickle cell & Haemoglobinopathies Screening testing
7.21.1 - consent for antenatal Infection Diseases in Pregnancy Screening testing (IDPS)
8.3.1- 8.3.3 - consent for Pregnancy loss
8.8.1 & 8.8.2 - consent for Postmortems

3.28. COMPLAINTS/CONCERNS/FEEDBACK

Formal

Formal complaints should be made directly to Chief Executive at Whiston Hospital, Warrington Road, Prescot, Merseyside, L35 5DR or Please refer to the information on our Trust Website: Mersey and West Lancashire Teaching Hospitals NHS Trust - MWL NHS | Raising Concerns or making a Complaint (merseywestlancs.nhs.uk).

Concerns or feedback

Pathology related issues/concerns should be directed to Mr Kevin McLachlan (Pathology Service Manager) by:

Telephone: 0151 290 4122
Email: Kevin.McLachlan@sthk.nhs.uk
In writing: Mr Kevin McLachlan
Pathology Department
Nightingale House
Whiston Hospital
Warrington Road
Prescot, L35 5DR

Or feedback can be provided by completing the Pathology Enquiry and feedback form available on the Trust Intranet and Webpages:

Pathology Webpage and user guide: www.merseywestlancs.nhs.uk/pathology

Pathology Intranet page click here (only available on Trust networks)

4. BIOCHEMISTRY (Including Immunology)

4.1. CONTACT NUMBERS (Including Clinical Advice)

The Biochemistry department is open 24/7 please see page 2/3 for details on how to contact the department and requesting urgent sample.

Routine enquires can be made by contacting the department Mon – Fri 09:00 – 17:00hrs

Biochemistry Laboratory	0151 430 1832 0151 430 1823 (Fax)
Consultant Chemical Pathologist	0151 430 **1833**
Clinical Biochemist	0151 290 4520
Blood Science Service Manager	0151 430 **1825** 0151 430 **1886**

4.1.1. Clinical Advice for Immunology

This is provided by Dr Anthony Rowbottom, Consultant Clinical Scientist and Hon. Senior Lecturer. Dr Rowbottom. Dr Rowbottom can be contacted as required via Dr Al-Jubouri, Consultant Chemical Pathologist, or Principal Clinical Biochemists Jen Atherton and Lewis Green or and Lucy Nugent (Clinical Scientist Immunology). Dr Rowbottom will respond to at least 95% of clinical enquiries within 48 hours.

4.1.2. Out of Normal Working Hours

For contacting the department to request urgent work, please see details on page 2.
For Clinical advice - User to contact switchboard and ask for Biochemistry medical/clinical cover.

4.2. Telephoned Results

Results are phoned to requestor when they fall outside agreed action and critical limits set by the department's clinical head of department. Please contact the department if further detail required. Please refer to the following policy on documenting and actioning results:

Policy for Actioning of Pathology Results Communicated by Telephone on the Trust intranet. Click here.

4.3. ABOUT BIOCHEMISTRY

The current workload is over 6,000,000 tests per annum. The range of services offered on site, and through regional and supra regional services, is comprehensive. On site we have up to date automated analysers handling routine chemistry, endocrine, vitamin assays, specific tumour markers and cardiac tests. We undertake lipid profiling, therapeutic drug monitoring (TDM) and the long term monitoring of diseases such as diabetics via HbA1c and microalbumin assays. More manual methods used include various types of electrophoresis and autoantibody screening.

4.4. Complex Biochemistry tests

4.4.1. Request Form and sample acceptance criteria

Request forms **MUST** be correctly filled out including clinical details. Please see section 3.15 and 3.16 for details

4.4.2. Complex Biochemistry Tests

Please contact the laboratory for details of complex tests such as Synacthen, overnight dexamethasone suppression and

water deprivation tests.

Please note ICE PACKs for samples that must be sent on ICE are available from Southport and Whiston Pathology Reception 24hrs a day and Ormskirk Pathology Reception during normal working hours.

4.4.3. Urgent Requesting

Please refer to section 3.13
Hypoglycaemic screen and ammonia requesting for samples at Ormskirk please contact Southport lab for instructions.

4.5. SPECIMEN REQUIREMENTS

The table in section 4.10 lists specimen requirements, turnaround times and reference ranges. Some tests are performed as part of a combined profile from the same sample as indicated.

4.5.1. Blood Profiles

The majority of profiles can be provided from one correctly filled 4.7 ml serum gel blood bottle. If the request includes some tests sent to other laboratories then a second sample is required.

If the sample should be kept on ice for transport to the laboratory (stated in 4.1 Specimen Information table), ice packs are available to collect from Specimen Reception 24hrs a day. The ice packs must be signed out by a member of staff and returned back to the lab. The ice pack can be used to transport samples that need to be kept on ice post-collection.

4.5.2. CSF

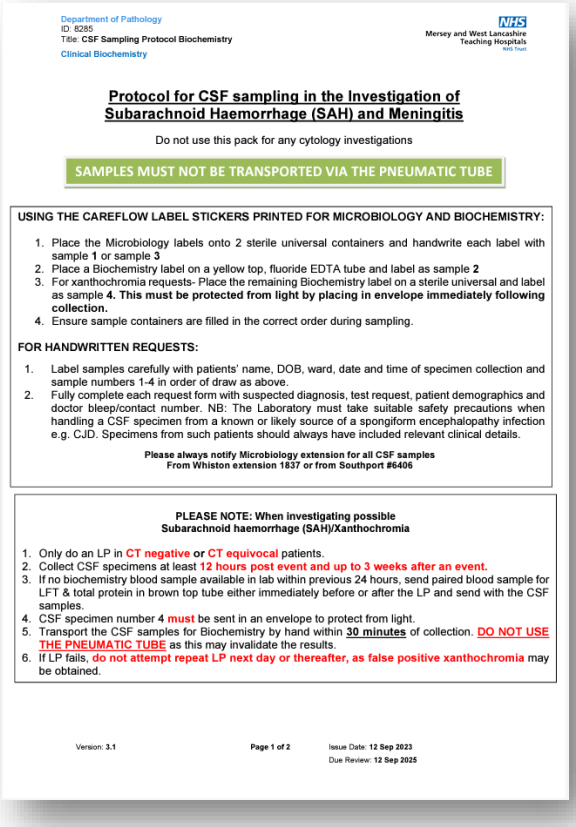
CSF collection kits are available on many wards and can also be obtained from Pathology Reception when required. These kits are to be used when investigating Subarachnoid Haemorrhage and/or Meningitis and contain the appropriate sampling bottles, request forms and instructions. The instructions are reproduced in the Microbiology Section 7.13.

PLEASE NOTE – when investigating possible SAH/Xanthochromia:

1. Only do an LP (lumbar puncture) in CT (computed tomography) Negative or CT equivocal patients.
2. Collect CSF samples aseptically at least 12 hours post event and up to 14 days after an event.
3. Take the blood samples either immediately before or after the LP and send with the CSF samples.
4. Transport the CSF samples for Biochemistry by hand within 30 minutes of collection.
   DO NOT USE THE PNEUMATIC TUBE as this may invalidate the test.
5. If LP fails, do not attempt repeat LP next day or thereafter, as false Xanthochromia may be obtained.

Sample for Xanthochromia must be protected from light.

Example of CSF collection pack:



Department of Pathology
ID: 8285
Title: **CSF Sampling Protocol Biochemistry**
Clinical Biochemistry

Mersey and West Lancashire Teaching Hospitals NHS Trust

Protocol for CSF sampling in the Investigation of Subarachnoid Haemorrhage (SAH) and Meningitis

Do not use this pack for any cytology investigations

SAMPLES MUST NOT BE TRANSPORTED VIA THE PNEUMATIC TUBE

USING THE CAREFLOW LABEL STICKERS PRINTED FOR MICROBIOLOGY AND BIOCHEMISTRY:

1. Place the Microbiology labels onto 2 sterile universal containers and handwrite each label with sample **1** or sample **3**
2. Place a Biochemistry label on a yellow top, fluoride EDTA tube and label as sample **2**
3. For xanthochromia requests- Place the remaining Biochemistry label on a sterile universal and label as sample **4. This must be protected from light by placing in envelope immediately following collection.**
4. Ensure sample containers are filled in the correct order during sampling.

FOR HANDWRITTEN REQUESTS:

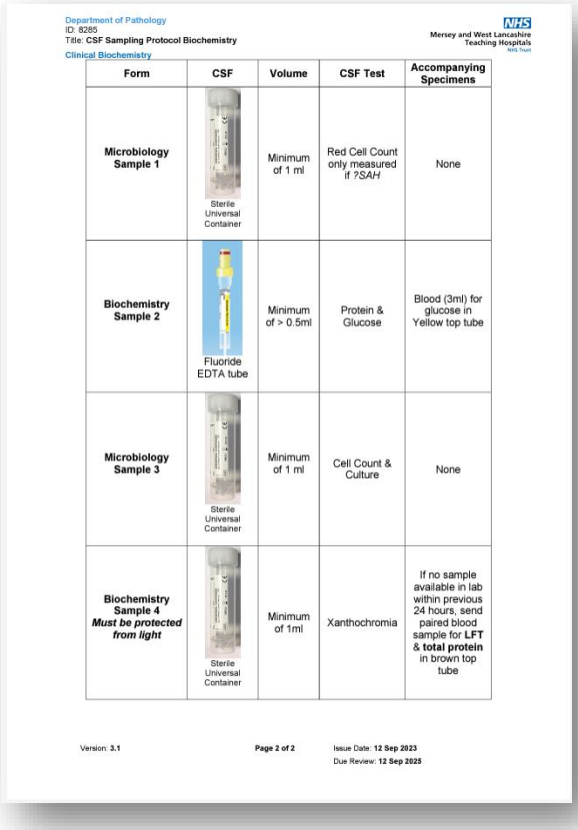
1. Label samples carefully with patients' name, DOB, ward, date and time of specimen collection and sample numbers 1-4 in order of draw as above.
2. Fully complete each request form with suspected diagnosis, test request, patient demographics and doctor bleep/contact number. NB: The Laboratory must take suitable safety precautions when handling a CSF specimen from a known or likely source of a spongiform encephalopathy infection e.g. CJD. Specimens from such patients should always have included relevant clinical details.

Please always notify Microbiology extension for all CSF samples From Whiston extension 1837 or from Southport #6406

PLEASE NOTE: When investigating possible Subarachnoid haemorrhage (SAH)/Xanthochromia

1. Only do an LP in **CT negative** or **CT equivocal** patients.
2. Collect CSF specimens at least **12 hours post event and up to 3 weeks after an event.**
3. If no biochemistry blood sample available in lab within previous 24 hours, send paired blood sample for LFT & total protein in brown top tube either immediately before or after the LP and send with the CSF samples.
4. CSF specimen number 4 **must** be sent in an envelope to protect from light.
5. Transport the CSF samples for Biochemistry by hand within **30 minutes** of collection. **DO NOT USE THE PNEUMATIC TUBE** as this may invalidate the results.
6. If LP fails, **do not attempt repeat LP next day or thereafter, as false positive xanthochromia** may be obtained.

Version: 3.1 Page 1 of 2 Issue Date: **12 Sep 2023** Due Review: **12 Sep 2025**



Department of Pathology
ID: 8285
Title: **CSF Sampling Protocol Biochemistry**
Clinical Biochemistry

Mersey and West Lancashire Teaching Hospitals NHS Trust

Form	CSF	Volume	CSF Test	Accompanying Specimens
Microbiology Sample 1	Sterile Universal Container	Minimum of 1 ml	Red Cell Count only measured if *?SAH*	None
Biochemistry Sample 2	Fluoride EDTA tube	Minimum of > 0.5ml	Protein & Glucose	Blood (3ml) for glucose in Yellow top tube
Microbiology Sample 3	Sterile Universal Container	Minimum of 1 ml	Cell Count & Culture	None
Biochemistry Sample 4 ***Must be protected from light***	Sterile Universal Container	Minimum of 1ml	Xanthochromia	If no sample available in lab within previous 24 hours, send paired blood sample for **LFT & total protein** in brown top tube

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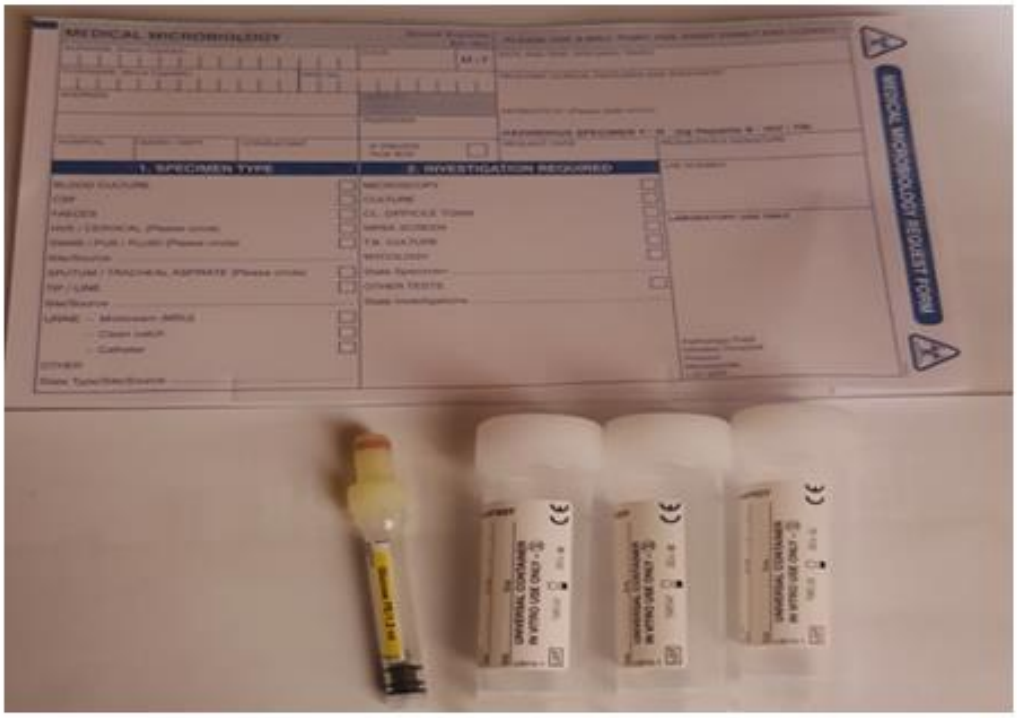


For CSF Immunophenotyping and CSF Cytospin and staining please contact the Haematology laboratory, see section 5.17.

4.5.3. Fluids

All fluid samples e.g. ascitic, pleural, synovial, gastric, CSF and wound specimens should be received in both a plain container (10 ml plain urine bottle yellow) and a fluoride EDTA blood bottle. Do not use sputum pots for fluids as they are liable to leak.

4.5.4. Urines

Please see the table in section 4.9, 4.11 and 4.12 for details of tests, sample volumes and preservatives required.

4.6. SPURIOUS RESULTS DUE TO INNAPPROPRIATE COLLECTION

PROBLEM	COMMON CAUSES	CONSEQUENCES
Delay in separation of serum	Overnight storage delay in transit	Increased K^+, PO_4, ALT, LDH Decreased HCO_3, (Na^+ occasionally)
Storage	Storing at 4°C	Increased K^+ Decreased HCO_3
Haemolysis	Expelling blood through needle into tube over vigorous mixing of specimen storing specimen in freezer (-20°C) excessive delay in transit leaving specimen in hot environment	For haemolysed samples at both St Helens and Knowsley and Southport, affected tests will not be reported and/or depending on degree of haemolysis reported with added comment highlighting how haemolysis may impact the results. For very grossly haemolysed samples **no** results will be reported.
Inappropriate sampling site	Specimen taken from drip arm	Increased drip analyte, e.g. glucose, K^+, Mg^{2+} Dilutional effect
Incorrect container or anticoagulant	No enzyme inhibitor EDTA tube (blue/red or yellow) or transferring blood form one tube to another	Low glucose Increased K^+ Decreased Ca^{2+}, ALP, Mg^{2+}
Lipaemia	Specimen taken after a fatty meal	Decreased Na^+

4.7. BIOLOGICAL REFERENCE INTERVAL (Reference Ranges)

References ranges for the majority of tests are listed in section 4.11; this is not an exhaustive list, for any information on a test not included please contact the laboratory. Biological Reference Intervals are subject to review and change periodically, please therefore refer to those stated on both electronic and paper reports as current in use ranges, abnormal results are highlighted.

4.8. SPECIFIC AREAS

4.8.1. Therapeutic Drug Monitoring (TDM)

The measurement of a limited amount of therapeutic drugs is available. Many of these samples need to be taken at a specific time pre or post dose. Please ensure the timing of the sample is appropriate and that the request is also appropriate (i.e. possible patient toxicity or non-compliance). If required, please contact the laboratory to discuss.

4.8.2. Tumour Markers

The measurement of some tumour markers are available, however, they are not to be used for primary diagnosis of cancers. Their main use is for monitoring therapeutic response and early detection of relapse.

4.8.3. Guidelines for Requesting Thyroid Function Test (TFT)

(Reviewed January 2019)

Introduction

Routine investigation of thyroid function in the Emergency Department, Critical Care or on acutely admitted unwell inpatients is not recommended except in exceptional circumstances where thyroid dysfunction is thought to be the major contributor to the presenting illness. Though often difficult to clinically diagnose, thyroid dysfunction is one of the most common medical conditions especially in elderly women. However, within the hospital setting abnormal results are more likely to represent 'non-thyroidal illnesses' due to other acute or chronic diseases rather than thyroid dysfunction. Most thyroid dysfunction is diagnosed and monitored in primary care.

Recommended Test Profiles

Our laboratory uses TSH as a front line test which is the single most sensitive, specific and reliable test. FT4 and FT3 are added automatically as required by the laboratory. There is no need to request FT4 and FT3 except in certain circumstances such as patients taking carbimazole or amiodarone or if central hypothyroidism is suspected.

Prior to testing for thyroid function the presence of previous results in CAREFLOW/ICE/Telepath should be sought. Repeat testing should not occur within a one month period. Mildly abnormal results will have an appropriate comment suggesting if a repeat sample is required and within what time period.

Around 15% of hospital patients will have TSH outside the normal range and fall between 0.1 - 0.2 or 6.0 - 20.0 mU/L. The majority of these will NOT have significant thyroid disease. A further 3% of hospital patients will have a TSH of <0.1 or >20 and less than half of these will have thyroid disease.

Population screening for thyroid disease is currently NOT recommended except for congenital hypothyroidism. Evidence supporting annual selective testing is in Type 1 diabetics (NOT for Type 2 diabetes), Down syndrome and Turners syndrome. Thyroid autoantibody testing is available but only in selected patients with thyroid dysfunction.

4.8.4. Guidelines for Requesting Liver Function Test (LFT)

(Reviewed January 2019)

Introduction

Liver disease may be suspected from the patients' history (high risk sexual or drug behaviour, probable systemic illness, medications or other causes) or from clinical examination (jaundice, abdominal pain, fever, vomiting, chronic stigmata or other complications) and then an LFT request should be made. Abnormal LFTs have a high predictive value for indicating an abnormality of the liver and provide clues to the nature of the problem. Random measurement of LFT in a screening manner is not recommended. In asymptomatic patients mild abnormalities may not be clinically significant. If the disease aetiology is not known other laboratory tests are available such as viral testing, auto antibodies, ferritin and iron studies, alpha1antitrypsin and caeruloplasmin and should be used in a schematic approach in conjunction with the laboratory.

Recommended Test Profiles

At present the laboratory LFT profile includes ALP, ALT, Bilirubin and albumin. GGT will be analysed automatically by the laboratory when ALP is 130 U/L and above in adults. GGT is still available to request in appropriate clinical scenarios like suspected alcoholism or monitoring abstinence. An increase in ALP and GGT indicates the presence of cholestasis whereas an elevated ALT indicates hepatocellular injury. Bilirubin may be raised in either condition. A decrease in albumin is a delayed marker of decreased liver synthetic ability and is inferior to the more sensitive prothrombin time. Prior to testing LFTs the presence of previous results in CAREFLOW/ICE/Telepath/Review should be sought. If recent results are normal, and there has be no change in clinical symptoms or management, repeat testing should not occur within a one week period.

4.8.5. Turnaround Times for Urgent/Routine/GP/Outpatient REQUESTS

For AED/Urgent requests the Biochemistry Department aim to process 90% of the results within 1 hour of receipt.

For routine requests from wards the Biochemistry Department aim to process 90% of the results within 2 hours of receipt.

4.8.6. Biotin interference in laboratory tests

Interferences in laboratory assays may cause erroneous results for example falsely high or falsely low. Examples of interferences include, but are not limited to, the nutritional supplement biotin, antibodies, drugs and metabolites, haemolysis, lipaemia, icterus and fluorescein. Due to their inherent nature, immunoassays are particularly susceptible to interference. Immunoassays are commonly used to measure hormones, tumour markers, cardiac enzymes and serology tests. If any results are unexpected or not in keeping with the clinical picture, please contact the clinical teams to discuss - Biochemistry on 0151 290 4520 (biochemistryclinical.team@sthk.nhs.uk) or the Microbiology Advice line 0151 430 1837 for any serology related queries.
A recent safety warning has been issued to highlight the impact of biotin in immunoassays when high doses are taken. The precise effect on results will vary with assay design and test, but the following table shows some assays with lower biotin tolerance:

May be significantly affected at high serum biotin levels	May be significantly affected at very high serum biotin levels
Testosterone Folate NT-Pro BNP SHBG Serology inc. Hep A, Hep B	Troponin I PTH Oestradiol Free T4

If a patient is taking high dose biotin supplementation, either prescribed or over the counter, please interpret results with care and question anything not in keeping with the clinical picture. If interference is suspected contact the clinical team as above and repeat tests after biotin has been discontinued for a period.

4.9. REFERRAL TESTS

There are over 100 different tests that are sent to a referral laboratory. For the most commonly requested referral tests please refer to Section 4.11 Specimen Information.

If a referral test is not available in the User Handbook please contact the Biochemistry Department for advice.

4.10. SPECIMEN INFORMATION

Please see the following link to the 'World Health Organisation Use of Anticoagulants in Diagnostic laboratory Investigations 2002'. This document has utility in telling users the time that analytes could be expected to be stable for in serum. Click here.

Please refer to section 3.23.1 and 3.23.2 for laboratory quoted sample stability for add on tests requests.

***A summary list of the Biochemistry test reference intervals (reference ranges) shown below is intended as a guide only. Majority of the Paediatric ranges have been omitted due to their complexity. Additionally, ranges may be updated periodically. Please refer to the ranges listed on electronic and paper result reports for the latest age and gender appropriate reference interval.**

(*Table below was updated May 2024)

TEST (BLOOD)	PROFILE	BLOOD BOTTLE	TURNAROUND	BIOLOGICAL REFERENCE INTERVAL	COMMENT
ACE (Angiotensin converting enzyme)	ACE	Serum	7 day	14 - 63 U/L	
Albumin	LFT, Calc, Prot, Elec	Serum	< 24 hrs	35 – 50 g/L adult	Paediatric range see report
Alcohol		Serum	< 24 hrs	See report	
Alkaline Phosphatase (adult)	LFT	Serum	< 24 hrs	30 -130 U/L	Increases in pregnancy and old age
Alkaline Phosphatase (paediatric)			< 24 hrs	See report	
Alpha 1 Antitrypsin		Serum	< 24 hrs	Age >15: 0.78 – 2.0 g/L	
Alpha Fetoprotein	AFP	Serum	< 24 hrs	non pregnant <8.1 ug /L	Investigation of testicular and hepatic tumours
ALT	LFT	Serum	< 24 hrs	10 - 49 U/L	
Ammonia		Lithium heparin (min 0.5ml)	< 24 hrs	Adult: 11 – 32 umol/L Critical: >100 umol/L Premature and sick neonates: <100 umol/L Mature neonates: <100 1 month – 16 years old: <50 umol/L	Send sample to lab on ice <10 mins.
Amylase		Serum	< 24 hrs	30 - 118 IU/L	Pancreatitis typically > 280

ANCA Screen **Anti-neutrophil cytoplasmic antibodies**		Serum	<3 days	MPO Negative <3.5U/ml Equivocal 3.5 – 5.0 IU/ml Positive > 5.0 IU/ml PR3 Negative <2.0 U/ml Equivocal 2.0 – 3.0 IU/ml Positive > 3.0 IU/ml	Please contact the laboratory if ANCA test required urgently. Consultant authorisation is required. Positive MPO and PR3 will be followed up with ANCA Fluorescence/Immunofluorescence testing
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Anti-Tissue Transglutaminase (ATTG)		Serum	7 days	Negative < 7 U/ml Equivocal 7 - 10 U/ml Positive > 10 U/ml	
AST		Serum	< 24 hrs	0 - 33 U/L	
B12		Serum	< 24 hrs	211-911 pg/ml	
Bicarbonate	Bica	Serum	< 24 hrs	22-29 mmol/L adult 19 - 28 mmol/L < 18 y	
Bile Acids		Serum (also EDTA plasma)	< 24 hrs	1.0 - 6.0 µmol/L	
Bilirubin	LFT, SBR	Serum	< 24 hrs	0 - 20 µmol/L	Please do not request a paediatric bilirubin and an LFT. The bilirubin will be done as part of the LFT.
NT -ProBNP		Serum (also EDTA plasma/Lithium Heparin plasma)	< 24 hrs	<125 ng/L for up to 75 years old <400 ng/L for over 75 years old	If FBC (Haematology) is also required, please send 2 tubes. NICE guidance: 400 - 2000 ng/L -For investigation of chronic heart failure suggest urgent referral for specialist assessment and transthoracic echocardiography within 6 weeks (NICE NG106, 2018) >2000 ng/L - Very high level of NT-ProBNP. For investigation of chronic heart failure suggest urgent referral for

					specialist assessment and transthoracic echocardiography within 2 weeks (NICE NG106, 2018)
C3		Serum	< 24 hrs	0.8 – 1.7 g/L adult	For Paediatric reference range see report
C4		Serum	< 24 hrs	0.12 – 0.36 g/L	
Ca 125		Serum	< 24 hrs	< 35 kU/L	Increases in ovarian carcinoma, ascites and adenomyosis
Calcium (adjusted)	Calc	Serum	< 24 hrs	2.20 – 2.60 mmol/L adult 2.20 – 2.70 mmol/L <16y Neonates – Unadjusted 2.00 – 2.70 mmol/L	
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Ca19-9	Ca19-9	Serum	7 days	<31 U/L	
Carbamazepine	Carb	Serum	< 24 hrs	4.0 – 12.0 mg/L	Assess pre-dose. Peak levels may be useful
Carboxyhaemoglobin	COHb	Lithium heparin	< 24 hrs	0-9 % (adult) <1.5% (<18 years)	Analysed on Radiometer Blood Gas Analysers.
CEA	CEA	Serum	< 24 hrs	<2.5 ug/L	Increases in colorectal carcinoma
Cholesterol	Chol	Serum	< 24 hrs	0-4.9 mmol/L	Desirable range
Chloride	Chlo	Serum	< 24 hrs	95 - 108 mmol/L	To calculate anion gap
CK (male)		Serum	< 24 hrs	Male 40 - 320 U/L	
CK (female)		Serum	< 24 hrs	Female 25 - 200 U/L	
Connective Tissue Disease Screen (CTD)	ANA	Serum	< 7 days negative result < 3 weeks referred	Negative or Referred	Equivocal/positives sent for confirmation & further typing. Reported in <3 weeks
Cortisol (9 am)		Serum	< 24 hrs	145 – 619 nmol/L	Reference range applies to samples collected at 9am

Creatinine (Male)	UE, Uric	Serum	< 24 hrs	Adult: 65 - 104 µmol/L	Male & Female Paediatric Ranges Various - Contact Laboratory
Creatinine (Female)	UE, Uric	Serum	< 24 hrs	Adult: 49 - 90 µmol/L	Male & Female Paediatric Ranges Various - Contact Laboratory
CRP	CRP	Serum	< 24 hrs	< 10 mg/L	
Anti – Cyclic Citrullinated peptide (Anti – CCP)		Serum	<7 days	Negative < 7 U/ml Equivocal 7 - 10 U/ml Positive > 10 U/ml	
Digoxin		Serum	< 24 hrs	0.8 – 2.0 ug/L	Sample >6 hrs after last dose
Direct Bilirubin	Dbili	Serum	< 24 hrs	≤5 µmol/L	
eGFR	UE	Serum	< 24 hrs	>60 ml/min/1.73m^2	NICE Guidelines (CG182)
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Electrophoresis	Ig's, Prot,Elec	Serum	7 days	See report	Included protein electrophoresis and immunofixation
Ferritin (Male)		Serum	< 24 hrs	15 – 322 µg/L (Male adult)	<15 = Iron Deficiency, 15 - 30 Low Iron Stores Please refer to the report for paediatric specific reference range
Ferritin (Female)		Serum	< 24 hrs	15 – 200 µg/L (Female adult)	<15 = Iron Deficiency, 15 - 30 Low Iron Stores Please refer to the report for paediatric specific reference range
Fluids (please see note at end of table)					
Folate		Serum	< 24 hrs	Sufficient >5.4 µg/L	Indeterminate 3.4 – 5.4 µg/L Deficient < 3.4 µg/L
Free T3	TFT's	Serum	< 24 hrs	Adult 3.5 – 6.5 pmol/L	Please refer to the report for paediatric specific reference range
Free T4	TFT's	Serum	< 24 hrs	(pmol/L) adult 11.5 - 22.7	30% fall in pregnancy, variable in sick euthyroids

				1 – 19yrs 11.1 - 19.5 2w – 1yrs 12.2 - 23.3 7d – 2w 14.0 - 29.0 <7d 14.8 - 36.1	
FSH	LH+FSH	Serum	< 24 hrs	Female: see report Male: 1.4 - 18.1 U/L	All results reviewed by Biochemistry clinical team and interpretive comment added to report if applicable.
Glomerular Basement Membrane Antibodies (GBM)	GBM	Serum	3 days	Negative < 7 U/mL Equivocal 7 - 10 U/mL Positive > 10 U/mL	Sample stability is seven days. Please contact the laboratory if GBM test required urgently. Consultant authorisation is required.
GGT	LFT	Serum	< 24 hrs	< 73 IU/L male < 38 IU/L female)	
Gentamicin		Serum	<12 hrs	See report	
Globulin	Prot	Serum	< 24 hrs	20 – 35 g/L	
Glucose	Gluc	Fluoride EDTA	< 24 hrs	Fasting 3.6 – 5.5 mmol/L Random 4.0 – 7.7 mmol/L	
Glucose Tolerance Test	GTT	Fluoride EDTA	< 24 hrs	See report	Fasting and 2-hour sample post glucose. Click here to view patient leaflet
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Haptoglobin		Serum	< 24 hrs	0.4 – 2.8 g/L	
HbA1c		Fluoride EDTA	72 hrs	0 – 41 nmol/mol	Local Mersey Guidelines. Mersey Diabetes Group Guidelines: • HbA1c level consistent with IGR (HbA1c 42-47) • HbA1c level diagnostic of diabetes mellitus (HbA1c ≥ 48) • Target for T2DM on less than full dose of 2 OHAs (HbA1c <48)

					• Target for T2DM on full dose of 2 or more OHAs (HbA1c <58) • Target for Type 1 diabetes (HbA1c <58) • Target for frail or hypoglycaemia unawareness (HbA1c <69)
HCG	HCG	Serum	<24 hrs	<5 IU/L (pregnancy) <5 IU/L (males, non-pregnant females)	Investigation of ectopic pregnancy (PHCG) and testicular tumours (HCG2) Women >45yrs & HCG 5-10 U/L comment appended due to possible increase post menopause
HDL Cholesterol	Lipids	Serum	< 24 hrs	≥0.99 mmol/L	Desirable range
IgA	Ig's	Serum	< 5 days	Adult 0.4 -3.5 g/L	Paediatric ranges – see individual report
IgE Specific		Serum	7 days	See report	Full clinical details required
IgE Total	IgE	Serum	7 days	Adult >16yrs : <81 kU/L	Paediatric ranges – see individual report
IgG	Ig's	Serum	< 5 days	Adult 6.5 -16.0 g/L	Paediatric ranges – see individual report
IgM	Ig's	Serum	< 5 days	Adult 0.5 – 3.00 g/L	Paediatric ranges – see individual report
Ketones *)		Lithium heparin	30 minutes	0 – 0.5 mmol/L	Lithium heparin sample must be sent immediately to lab. Phone lab in advance (Please note at Southport and Ormskirk Hospitals, Blood Ketones is only available as a Point of Care test on designated wards)
Iron		Serum	< 24 hrs	Female 9 - 30.4 µmol/L Male 11.6 – 31.3 µmol/L	
Iron studies		Serum	< 24 hrs	See report	Only in borderline anaemia
Lactate		Fluoride EDTA	< 24 hrs	0.5 – 2.2 mmol/L	Sample on ice to lab < 10 min after collection
LDH		Serum	<24 hrs	120 – 246 U/L	
LDL Cholesterol		Serum	< 24 hrs	0-2.9 mmol/L	Target range

LH	LH+FSH	Serum	< 24 hrs	Female: see report Male: 1.5 – 9.3 IU/L	All results reviewed by Biochemistry clinical team and interpretive comment added to report if applicable.
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Lithium		Serum	< 24 hrs	0.4 – 1.0 mmol/L	Sample 12 hrs after dose
Magnesium		Serum	< 24 hrs	Adult 0.7 – 1.0 mmol/L	Please refer to the report for paediatric specific reference range
Methaemoglobin		Lithium Heparin	<24 hr	0 – 1.5 %	
Non-HDL Cholesterol		Serum	<24 hrs	0-3.9 mmol/ L	
Oestradiol		Serum	< 24 hrs	Female: See report Male: <146 pmol/L	All results reviewed by Biochemistry clinical team and interpretive comment added to report if applicable.
Osmolality		Serum	< 24 hrs	275 – 295 mOsmol/Kg	
Paracetamol		Serum	< 24 hrs	Overdose assay mg/L	Interpreted according to treatment nomogram
Parathyroid Hormone (PTH)		Serum or EDTA	< 24 hrs	2.0 – 9.3 pmol/L	Send a bone profile at the same time. Send to the lab prompt after collection
Phenytoin		Serum	< 24 hrs	<3mo = 6-15 Mg/L 10 – 20 mg/L	Sample just before next dose
Phosphate		Serum	< 24 hr	Adult 0.8 – 1.5 mmol/L	
Placental growth factor		EDTA	< 2 hrs	>100 pg/mL	Interpretative comment see report
Potassium	UE	Serum	< 24 hrs	3.5 – 5.3 mmol/L adult 3.5 – 5.0 1y – 16y 3.5 – 5.7 28d - 1d infant 3.4 – 6.0 <28d neonate	Please refer to the report for paediatric specific reference range
Procalcitonin		Serum	<24 hrs	<0.05 ng/ml	
Progesterone		Serum	< 24 hrs	See report	
Prolactin (Male)		Serum	< 24 hrs	45 – 375 mIU/L	
Prolactin (Female)		Serum	< 24 hrs	59 – 619 mIU/L	

Protein	Prot, Elec	Serum	< 24 hrs	60 – 80 g/L >1y and Adult 46 – 76 g/L 2d -12 mo 34 – 50 g/L Newborn – 3mo	Please refer to the report for paediatric specific reference range
PSA		Serum	<24 hrs	<49y 0 - 2.5 ng/ml 49-58y 0 - 3.5 ng/ml 59-68y 0 - 4.5 ng/ml >68y 0 - 6.5 ng/ml	
Rheumatoid Factor (IgM)		Serum	<24 hrs	< 14 Negative >or equal to 14 Positive	Analyser assay performed on has changed
Salicylate		Serum	< 24 hrs	Overdose assay mg/L	
Serum Free Light Chains		Serum	5 days	Kappa 6.7-22.4 mg/L Lambda 8.3-27 mg/L Kappa/Lambda ratio (0.31-1.56)	
TEST (BLOOD)	**PROFILE**	**BLOOD BOTTLE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Sex Hormone Binding Globulin (male)		Serum	<24 hrs	Males (all in nmol/L) 2- 10y 34.6 - 162.3 10-11y 17.7 - 114.7 11-12y 15.2 - 116.4 12- 13y 14.7 - 109.1 13-14y 13.1 - 80.6 14-15y 11.8 - 40.5 16-21y 11.1 - 49.8 21-49y 11.5 - 54.5 50 and older 17.3 - 71.5	Please see report for age specific reference range
Sex Hormone Binding Globulin (female)		Serum	<24 hrs	Females (all in nmol/L) 2-10y 29.1 - 158.5 11-15y 15.6 - 101.7 16-21yrs 19.4 - 161.8 21-50yrs 17.7 - 138.3	Please see report for age specific reference range

				50 and older 23.7 - 110.6	
Sodium	UE	Serum	< 24 hrs	133 – 146 mmol/L	
Testosterone (male)		Serum	< 24 hrs	(all in nmol/L) 80 – 99 yrs 4.1 -31.3 50 – 79 yrs 6.6 -31.3 40 – 49 yrs 7.2 – 31.3 19 – 39 yrs 7.9 – 31.3 15 – 18 yrs 4.2 – 26.2 12-14 yrs ≤ 23.3 1 – 11 yrs ≤ 0.9 <1 yrs ≤ 9.1	
Testosterone (female)		Serum	< 24 hrs	(all in nmol/L) >19 yrs 0.3 - 1.2 12 – 18yrs 0.4 – 1.9 1 – 11yrs ≤ 0.9 <1yrs 0.3 - 1.2	
Calculated Free Testosterone				Female (nmol/L): <0.020 Male (nmol/L) : Excludes deficiency ≥ 0.225 Possible deficiency 0.180 – 0.224 Suggestive of deficiency < 0.180	Please refer to the report for paediatric specific reference range
Theophylline		Serum	< 24 hrs	10 - 20.0 mg/L	
Tissue Autoantibody Screen (TAA)	AMA SMA GPC LKM	Serum	< 7 days negative result < 3 weeks referred	Negative or referred	Equivocal/positives sent for confirmation & further typing. Reported in <3 weeks

Transferrin		Serum	<24hrs	Female Adult 2.5 - 3.8 g/L Male Adult 2.15 - 3.65 g/L	Please refer to the report for paediatric specific reference range
Triglycerides	Lipids	Serum	< 24 hrs	<0 – 1.9 mmol/L	Fasting sample required
Troponin I (All sites)		Serum	<24 hrs	<46 ng/L	
TSH	TFT's	Serum	< 24 hrs	<59y = 0.49 – 5.23 mIU/L 60 -79y = 0.34 – 5.44 mIU/L 80+ y = 0.27 – 6.05 mIU/L	Variable in sick euthyroids
Thyroid Peroxidase	TPO	Serum	<24 hrs	0 -59 U/mL	
Urea	UE	Serum	< 24 hrs	2.5 – 7.8 mmol/L	
Uric acid/Urate (Male)	Uric	Serum	< 24 hrs	200 - 430 µmol/L	
Uric acid/Urate (Female)	Uric	Serum	< 24 hrs	140 - 360 µmol/L	
Valproate		Serum	< 24 hrs	50 – 100 mg/L	Does not correlate with efficacy.
Vancomycin		Serum	<12 hrs	See report	
VIT D		Serum	<24 hrs	See report	
Zinc	UE	Serum	<24 hrs	10.7 – 18.4 µmol/L	
TEST (CSF)	**SAMPLE**	**PRESERVATIVE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Glucose	CSF	Fluoride EDTA	<2 hrs	Adult 2.2 – 3.9 mmol/L Paediatric 3.3 – 4.4 mmol/L	
Protein	CSF	Refer to section 5.12	< 2hrs	>1month – adult 0.15 - 0.45 g/L	See report for <1 months
Xanthochromia	CSF	Refer to section 5.12	<6 hrs	See report	CSF xanthochromia analysis is only available after 17:00hrs if authorisation has been sought from Consultant Chemical Pathologist/Clinical Biochemists. **Please protect sample from light.**
TEST (URINE)	**SAMPLE**	**PRESERVATIVE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**

Bence-Jones protein (BJP)	EMU		<8 days	Pos or Neg	EMU - early morning urine.
Calcium	24 hrs	25 ml HCL	< 24 hrs	2.5 - 7.5 mmol/24 hr	
Urine Pregnancy Test	-	-	-	-	No longer offered by the department
Creatinine	24 hrs		< 24 hrs	Females: 5.3 -15.9 mmol/24 hr Males: 8.4 -22 mmol/24hr	
Creatinine Clearance	24 hrs		< 24 hrs	>90 mL/min	A paired serum UE sample to be collected within +/- 48 hours of the urine request for Creatinine Clearance
Creatinine:microalbumin (male and female)	EMU		<24 hrs	<3.0 mg/mmol	EMU – early morning sample
Magnesium	24 hrs		<24 hrs	2.4 – 6.5 mmol/24 hr	
Microalbumin	Random		< 24 hrs	See report	
Osmolality	Random		< 24 hrs	Variable	Interpret with serum osmolality
Phosphate	24 hrs	25 ml HCL	< 24 hrs	15-50 mmol/24 hr	
Potassium	Random		< 24 hrs	Interpret with serum potassium	
Protein	24 hrs		< 24 hrs	0.00 - 0.14 g/24 hr	
Protein:creatinine ratio	Random		<24 hrs	<45 mg/mmol <30 mg/mmol in pregnancy	
Reducing Substance *	Fresh urine (same day)		< 4 days (but can be performed urgently)	Negative	Positive samples confirmed by Thin Layer Chromatography
Sodium	24 hrs or random		< 24 hrs	40 – 220 mmol/24hr For random urine sodium see report	
Uric acid	24 hrs		< 24 hrs	1.5 – 4.5 mmol/24 hr	
Urea	24 hrs or random		< 24 hrs	430 – 710 mmol/24 hr	For random urine urea see report

				For random urine urea see report	
TEST (FLUIDS)	**SAMPLE**	**PRESERVATIVE**	**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Fluid electrolytes, Urea & Creatinine*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid Amylase*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid Protein*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid LDH*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid Uric Acid*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid Triglycerides*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Fluid Cholesterol*	**Random**	10 ml yellow urine container Plain	**<24hrs**	**NA**	
Faeces	**Faeces**				
Faecal Calprotectin	**Faeces**	Universal white top faeces pot	**10 days**	**Negative < 99 µg/L** **Equivocal 100 – 249 µg/L** **Positive >250 µg/L**	**NICE Guidance – The new faecal calprotectin care pathway April 2018**
Faecal Immunochemical testing (FIT)	**Faeces**	Special container contact lab	**<48hrs**	**0 – 9.9 ug/g Hb**	**Refer to appropriate clinical pathway**
MISCELLANEOUS	**SAMPLE**		**TURNAROUND**	**BIOLOGICAL REFERENCE INTERVAL**	**COMMENT**
Sweat Test	Sweat		< 1 day from date of analysis	Sweat Chloride (For neonates and adults) <30 CF Unlikely 30 - 59 Further Testing Required	Contact lab to make appointment. Consent for sweat testing is undertaken by the clinical team, laboratory staff will confirm with patient/carer that an information leaflet was provided, and

				>60 High Likelihood of CF	they are still happy to proceed with the procedure knowing there is a small risk of burns. Patient leaflets are available on Pathology intranet and website click here.

Please note Urine Pregnancy Test is no longer offered by the department.
***Please note that all Fluids, Ketones, Reducing substances assays are not accredited to ISO15189.**
Mo= Month
y = year
d = day

4.11. Biochemistry Referral Tests

Turnaround Times quoted are for guidance only and may vary due to factors beyond our control.

Turnaround Times are measured from the date of collection to the receipt of report from the referral laboratory.
(Please Note: Days indicates working days)

Please see electronic or paper copies of reports for reference ranges

TEST NAME	SAMPLE TYPE	REFERRAL LABORATORY	UKAS REG. No.	INCLUDED IN UKAS ISO 15189 SCOPE	TURN-AROUND TIME	SPECIAL INSTRUCTIONS/COMMENTS
5-Alpha Dihydrotestosterone	Serum	Department of Specialist Laboratory Medicine Block 46 St James University Hospital Leeds LS9 7TF	8492	Y	45 days	
5HIAA	24h urine with acid	Clinical Biochemistry South Manchester Hospital	9063	Y	20 days	Before and during collection avoid: Bananas, Avocados,

		Southmoor Road Wythenshawe Manchester M23 9LT				Plums, Pineapple, Kiwi, Walnut, Tomatoes, and cough syrup.
Acetycholine Receptor ab	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	15 days	
ACTH	EDTA on ice	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	Sample must be sent immediately to the lab on ice (hand delivery recommended)
Acyl Carnitine	Lithium-heparin or blood spot	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	35 days	
Adalimumab	Serum	Blood Sciences Laboratory Royal Devon & Exeter NHS Foundation Trust Barrack Road Exeter EX2 5DW	8210	Y	20 days	
Aldosterone	EDTA	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	18 days	Collect samples at room temperature from overnight recumbent patient. Send to lab immediately
Alkaline Phosphatase Isoenzymes	Serum	Clinical Biochemistry Level D Southhampton General Hospital Tremona Road Southampton SO16 6YD	8483	Y	20 days	
Alpha Galactosidase A	EDTA	Willink Biochemical Genetics Unit St Mary's Hospital Oxford Road Manchester M13 9WL	9865	Y	17 days	Results may take longer if further analysis is required
Alpha Sub-unit (Pituitary polypeptide)	Serum	Clinical Laboratory Services Level Minus1 Queen Elizabeth	8910	N	31 days	

		Hospital Mindelsohn Way Birmingham B15 2WB				
Alpha-1- acid Glycoprotein	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	17 days	
alpha-1-antitrypsin phenotyping	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	20 days	
Aluminium	Lithium-heparin	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	13 days	
Amino acids	Serum or Lithium-heparin, Random urine or CSF	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	18 days	
Amiodarone	Serum or Lithium-heparin	University Hospitals of Leicester Level 4 Sandringham Building Leicester Royal Infirmary NHS Trust Infirmary Square leicester LE1 5WW	8376	Y	24 days	
ANA (Hep cells)	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	8 days	
Androstenedione	Serum or Lithium-heparin	Clinical Biochemistry South Manchester Hospital	9063	Y	20 days	

		Southmoor Road Wythenshawe Manchester M23 9LT				
Anti Adrenal ab	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	15 days	
Anti Basal Ganglia ab	Serum	Neuro-Immunology Laboratory Box 76 National Hospital for Neurology Queens Square London WC1N 3BG	8045	Y	20 days	
Anti beta 2 Glycoprotein IgG	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
Anti GAD ab	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
Anti Gangliosides (GQ1b) (anti Glycolipid abs)	Serum	Neuro-Immunology Laboratory Box 76 National Hospital for Neurology Queens Square London WC1N 3BG	8045	Y	20 days	
Anti Mullerian Hormone	Serum	Clinical Biochemistry MacEwen Building Glasgow Royal Infirmary 84 Castle Street Glasgow G4 0SF	9572	Y	24 days	
Apolipoprotein Profile (Lipoprotein Subfractions)	Serum or EDTA	Clinical Biochemistry MacEwen Building Glasgow Royal Infirmary 84 Castle Street Glasgow G4 0SF	9572	Y	17 days	
Aquaporin 4 antibody	Serum	Immunology Churchill Hospital Headington Oxford OX3 7LE	8782	N	24 days	

Arylsulphatase-A	Lithium-heparin	SAS Genetic Enzyme Lab 5th Floor Guy's Tower Guy's Hospital London SE1 9RT	8688	Y	Up to 52 days	Routine single enzyme: 24 days Part of enzyme screen: 52 days Neuro screen: 52 days Prenatal: 17 days
B2 Microglobulin	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	19 days	
Batten's Disease (TPP & PPT)	Lithium-heparin	Enzyme Laboratory Chemical Pathology Camelia Botnar Laboratories Gt Ormond St Children's NHS Trust London WC1N 3JH	8692	Y	52-66 days	
Beta Carotene	Serum or Lithium-heparin	Clinical Biochemistry MacEwen Building Glasgow Royal Infirmary 84 Castle Street Glasgow G4 0SF	9572	Y	20 days	Samples must be protected from light
Beta HCG (Placental Site Trophoblastic Tumour Investigation)	Serum	Clinical Biochemistry Royal Hallamshire Hospital Sheffield S10 2JF	8509	Y	15 days	
Beta-hydroxybutyrate	Seum, Lithium-heparin, urine or vitreous fluid	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	18 days	

Beta-Hydroxybutyrate for post mortem samples only	Fluoride EDTA	Clinical Biochemistry Level D Southhampton General Hospital Tremona Road Southampton SO16 6YD	8483	Y	22 days	
Biotinidase	Lithium-heparin or serum	Newborn Screening & Biochemical Genetics Paediatric Laboratory Medicine Birmingham Children's Hospital Whittall Street Birmingham B4 6DH	9948	Y	20 days	Sample must be received in lab within 30 mins of venepuncture
B-Trace Protein	Fluid plus serum	Neuro-Biochemistry B-Trace Protein The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	10 days	
C1 Esterase Inhibitor	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	17 days	
CA15-3	Serum	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	
Caeruloplasmin	Serum or Lithium-heparin	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<11 days	

Calcitonin	Serum	Clinical Biochemistry Christie Hospital NHS Trust Wilmslow Road Withington Manchester M20 4BX	8697	Y	42 days	Sample must be received in laboratory within 15 mins of venepuncture
Carbohydrate Deficient Transferrin	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
Carnitine	Lithium-heparin	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	35 days	
CH50-Total Complement Screen	Serum, must be received in laboratory within 2h	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
7-Dehydro-Cholesterol	Lithium-heparin	Clinical Biochemistry Sheffield Children's Hospital Western Bank Sheffield S10 2TH	10139	Y	38 days	
Cholinesterase Phenotyping	EDTA sample preferred by Serum is acceptable	Clinical Biochemistry Cholinesterase Investigation Unit Pathology Services Building Southmead Hospital Westbury-on-Trym Bristol BS10 5NB	8071	Y	Up to 94 days	Phenotype: 31 days Genotype: 94 days EDTA Whole blood preferred (for genetic testing if required) however 0.5ml minimum serum is acceptable if EDTA sample is not available
Chromium	EDTA or urine	SAS Trace Elements Lab Surrey Research Park 15 Frederick Sanger Road Guildford Surrey GU2 7YD	9732	Y	15-20 days	

Chromogranin A	Serum or EDTA	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	24 days	
Cobalt	EDTA whole blood, urine	SAS Trace Elements Lab Surrey Research Park 15 Frederick Sanger Road Guildford Surrey GU2 7YD	9732	Y	15-20 days	
Collagen Type II ab	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
Copper	Serum or 24h urine without acid	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<13 days	
Cortisol (11-deoxy)	Serum	Clinical Biochemistry Pathology and Pharmacy Building Bart's and the London NHS Trust 80 Newark Street Whitechapel	8285	Y	20 days	
C-Peptide	Serum or Lithium-heparin	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	12 days	Fasting sample or sample collected during hypoglycaemic attack (simultaneous glucose sample required to confirm hypoglycaemia). Sample must be received in lab within 15 mins of venepuncture
C-Peptide	Serum or Lithium-heparin	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	Fasting sample or sample collected during hypoglycaemic attack (simultaneous glucose sample required to confirm hypoglycaemia).

						Sample must be received in lab within 15 mins of venepuncture
Cryoglobulins	7.5ml serum at 37C. Please contact the lab for a flask and any other queries.	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	13 days	Results may take longer if screening test is positive
CSF Lactate	CSF	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	9 days	
CTX1 (C-terminal telopeptide of type I collagen)	EDTA (FBC tube plasma) send to laboratory immediately	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<11 days	Fasting morning sample (09:00-12:00) preferred. A baseline pre-treatment measurement is required if assessing response to anti-resorption therapy.
Cyclosporin	EDTA	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L78XW	9785	Y	<11 days	
Cyclosporin (Paeds) (Cyclosporin)	EDTA	Clinical Biochemistry Freeman Hospital Newcastle upon Tyne NE7 7DN	8543	Y	12 days	
Cystic Fibrosis	EDTA	Cheshire & Merseyside Regional Cytogenetics Lab Liverpool Women's NHS Foundation Trust Crown Street Liverpool L8 7SS	9322	Y	Up to 56 days	Prenatal: 11 days. Familial: 36 days

Cytogenetics	Lithium-heparin	Cheshire & Merseyside Regional Cytogenetics Lab Liverpool Women's NHS Foundation Trust Crown Street Liverpool L8 7SS	9322	Y	Up to 28 days	High Priority 1–3 days Urgent 7–10 days Routine: 21 - 28 days Reports sent directly to requestor
Cytotoxic Antibodies	Serum	Department of Histocompatability and Immunogenetics 3rd Floor Duncan Building Royal Liverpool University Hospital Prescot Street Liverpool L7 8XP	9779	Y	N/A.	Samples are stored until availability of potential donor
DHEAS	Serum	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	13 days	
DNA studies	EDTA	Cheshire & Merseyside Regional Cytogenetics Lab Liverpool Women's NHS Foundation Trust Crown Street Liverpool L8 7SS	9322	Y	Up to 40 days	Pre natal: 3 days Routine: 20 days Gene screen: 40 days Reports sent directly to requestor
Drugs of Abuse screen	Random urine or 24h urine without acid	Clinical Biochemistry Salford Royal NHS Foundation Trust Hope Hospital Stott Lane Salford Manchester M6 8HD	8331	Y	13 days Extended screen 17 days	POCT urine drug screening cups are not suitable containers for this test.
Erythropoeitin	Serum	Wolverhampton Road Heath Town Wolverhampton West Midlands WV10 0QP	8407	Y	24 days	
Faecal alpha-1 anti-trypsin	Faeces	Protein Reference Unit, Southwest London Pathology,	8989	Y	15 days	

		St Georges Hospital Blackshaw Road, Tooting, London SW17 0QT				
Faecal Elastase	Faeces	Southwest Pathology Services Building 3 Lisieux Way Taunton Somerset TA1 2LB	9769	Y	17 days	
Flecainide	Serum	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	13 days	
Free Fatty Acids	Serum or Lithium-heparin	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	38 days	
G-1-PUT	Lithium-heparin or blood spot	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	13 days	
GABA Receptor Antibodies	Serum	Department of Neuro-Biochemistry The Walton Centre for Neurology & Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8782	N	31 days	
Gastrin	EDTA on ice	Clinical Biochemistry Charing Cross Hospital London W6 8RF	8673	Y	51 days	Fasting sample to be sent immediately to the lab on ice (hand delivery recommended)
GCK Gene Analysis (MODY)	EDTA	Molecular genetics laboratory Royal Devon & Exeter NHS	8092	Y	56 days	Results sent directly to requestor

		Foundation Trust Barrack Road Exeter EX2 5AD				
Glycosaminoglycans Mucopolysaccharides)	Random urine	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	38 days	
Growth hormone	Serum	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	GH usually measured as part of a DFT. A single measurement provides little diagnostic information
Gut hormones	2 x EDTA on ice	Clinical Biochemistry Charing Cross Hospital London W6 8RF	8673	Y	51 days	Samples to be sent immediately to the lab on ice (hand delivery recommended)
Hexosaminidase A&B	Serum or Lithium-heparin	SAS Genetic Enzyme Lab 5th Floor Guy's Tower Guy's Hospital London SE1 9RT	8688	Y	Up to 52 days	Single enzyme 24 days Enzyme or neuro screen 52 days Prenatal test 17 days Tay-Sach's carrier test 24 days
HFE gene	EDTA	Cheshire & Merseyside Regional Cytogenetics Lab Liverpool Women's NHS Foundation Trust Crown Street Liverpool L8 7SS	9322	Y	36 days	
Histone abs	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	20 days	
HLA DQ2	EDTA	Department of Histocompatability and Immunogenetics 3rd Floor Duncan Building Royal	9779	Y	18 days	

		Liverpool University Hospital Prescot Street Liverpool L7 8XP				
Homocysteine	EDTA send to laboratory immediately	Department of Specialist Laboratory Medicine Block 46 St James University Hospital Leeds LS9 7TF	8492	Y	28 days	
IgA deficiency	Serum	RCI Laboratory NHSBT Longley Lane Sheffield S5 7JN	8740	Y	15 days	
IGF1	Serum, only sent to Guildford if IGF2 also requested	Guildford SAS Hormone Centre Clinical Laboratory Royal Surrey County Hospital Egerton Road Guildford Surrey GU2 7XX	9732	Y	24 days	
IGF-1	Serum	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	
IGF-2	Serum	Guildford SAS Hormone Centre Clinical Laboratory Royal Surrey County Hospital Egerton Road Guildford Surrey GU2 7XX	9732	Y	24 days	
IGFBP-3	Serum	Guildford SAS Hormone Centre Clinical Laboratory Royal Surrey County Hospital Egerton Road Guildford Surrey GU2 7XX	9732	Y	14 days	
IgG Subclasses	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane, Fulwood Preston PR2 9HT	8547	Y	37 days	

IgGTTG	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	14 days	
Infliximab	Serum	Blood Sciences Laboratory Royal Devon & Exeter NHS Foundation Trust Barrack Road Exeter EX2 5DW	8210	Y	20 days	
Insulin	Serum or Lithium-heparin	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	12 days	Fasting sample or sample collected during hypoglycaemic attack (simultaneous glucose sample required to confirm hypoglycaemia). Sample must be received in lab within 15 mins of venepuncture
Insulin	Serum or Lithium-heparin	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	Fasting sample or sample collected during hypoglycaemic attack (simultaneous glucose sample required to confirm hypoglycaemia). Sample must be received in lab within 15 mins of venepuncture
Insulin abs	Serum	Guildford SAS Hormone Centre Clinical Laboratory Royal Surrey County Hospital Egerton Road Guildford Surrey GU2 7XX	9732	Y	17 days	
Intrinsic Factor abs	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	17 days	

Islet Cell abs	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	15 days	
Lamotrigine	Serum or Lithium-heparin	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	10 days	
Laxative Screen	Random urine	West Midlands Toxicology Laboratory Department of Clinical Biochemistry City Hospital Dudley Road Winson Green Birmingham B18 7QH	8407	N	12-13 days	
Lead	EDTA	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	13 days	
Levetiracetam	Serum	The Walton Centre for Neuro-Biochemistry Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	5 days	200µl minimum volume.
Mannose Binding Lectin	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	17 days	
Mast Cell Tryptase	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	17 days	
MEN 1 Genetic Testing	Contact laboratory	Molecular Genetics Laboratory Royal Devon & Exeter NHS	8092	Y	Up to 40 days	Report sent directly to requestor Full screen 40 days Family members 20 days

		Foundation Trust Barrack Road Exeter EX2 5DW				
Mercury	Urine	Clinical Biochemistry Level D Southhampton General Hospital Tremona Road Southampton SO16 6YD	8483	Y	20 days	
Metanephrines	EDTA on ice (fasting)	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	20 days	Sample needs to be collected at one of the hospital sites (hand delivery recommended) and sent immediately to the lab on ice
Methotrexate	Serum or plasma	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	8 days	Urgent results available on day of receipt at referral laboratory
Methyl Malonic Acid	Serum	Neuro-Metabolic Unit Laboratory Box 105 National Hospital for Neurology Queens Square London WC1N 3BG	8341	Y	17 days	
MUSK a/b	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	29 days	
Neuronal ab (Paraneoplastic)	CSF or Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	23 days	
NMDA	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	18 days	

NSE	Serum	Immunology Supraregional Protein Reference Unit PO Box 894 Sheffield S5 7YT	8494	Y	13 days	
Oligoclonal Bands	CSF plus serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	13 days	
Ovarian abs	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	11 days	
P1NP	Serum	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<15 days	
PBG	Urine protected from light	Clinical Biochemistry Salford Royal NHS Foundation Trust Hope Hospital Stott Lane Salford Manchester M6 8HD	8331	Y	24 days	Urgent results available within 4 hours of receipt at referral laboratory
Phenobarbitone	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	10 days	Sample to be collected prior to next dose
Porphyria screen	Urine, faeces and EDTA protected from light	Clinical Biochemistry Salford Royal NHS Foundation Trust Hope Hospital Stott Lane Salford Manchester M6 8HD	8331	Y	Faecal: 38 days RBC: 24 days Plasma: 17 days	Samples required vary with presentation. Urine, Faecal and blood samples may be collected, please contact laboratory for advice on which samples to collect

					Urine: 17 days	
Progesterone (17-OH)	Serum	Clinical Biochemistry Royal Manchester Children's Hospital Oxford Road Manchester M13 9WL	8651	Y	20 days	
Purkije ab (Paraneoplastic)	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	23 days	
Quad Test	Serum	Antenatal Screening Clinical Biochemistry Royal Bolton Hospital Minerva Road Farnworth Bolton BL4 0JR	9925	Y	4 days	Reports sent directly to requestor
Reducing Substances (Chromatography)	Random urine	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	11 days	
Renin	EDTA , send to laboratory immediately	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	18 days	Collect samples at room temperature from overnight recumbent patient. Send to lab immediately
Selenium	Serum, urine	SAS Trace Elements Lab Surrey Research Park 15 Frederick Sanger Road Guildford Surrey GU2 7YD	9732	Y	17 days	
Silver	EDTA or urine	SAS Trace Elements Lab Surrey Research Park 15 Frederick Sanger Road Guildford Surrey GU2 7YD	9732	Y	20-25 days	

Sirilimus	EDTA	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	11 days	
Skin abs	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	13 days	
Steroid Profile	Random urine	Clinical Biochemistry UCLH 3rd Floor 60 Whitfield Street London W1T 4EU	8169	Y	17 days	
Steroid Sulphatase	EDTA	Willink Biochemical Genetics Unit St Mary's Hospital Oxford Road Manchester M13 9WL	9865	Y	31 days	
Stone analysis	Calculus	Clinical Biochemistry UCLH 3rd Floor 60 Whitfield Street London W1T 4EU	8169	Y	13 days	
Sulphanyureas	Serum, random urine	Guildford SAS Hormone Centre Clinical Laboratory Royal Surrey County Hospital Egerton Road Guildford Surrey GU2 7XX	9732	Y	17 days	
Tacrolimus	EDTA	LCL Clinical Support Services Building (CSSB) Mount Vernon Street Liverpool L7 8YE.	9899	Y	17 days	
Thiazide Diuretic Screen	Random urine	West Midlands Toxicology Laboratory Department of Clinical Biochemistry City	8407	N	11-12 days	

		Hospital Dudley Road Winson Green Birmingham B18 7QH				
Thioguanine Nucleotides (TGN)	EDTA	Clinical Biochemistry City Hospital Dudley Road Birmingham B18 7QH	8407	Y	12 days	
Thyroglobulin	Serum	Department of Clinical Chemistry 4th Floor Duncan Building Royal Liverpool University Hospital Prescot Street Liverpool, L7 8XP	**9785**	Y	10 days	
Thyroid Receptor a/b	Serum	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	<22 days	
Tissue autoabs	Serum	Lancashire & Lakeland Immunology Service Royal Preston Hospital Sharoe Green Lane Fulwood Preston PR2 9HT	8547	Y	13 days	
Topiramate	Serum or Lithium-heparin	Department of Neuro-Biochemistry The Walton Centre for Neurology & Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8353	Y	11 days	
Toxic Alcohols	Methanol - Lithium-heparin	West Midlands Toxicology Laboratory Department of Clinical Biochemistry City	8407	Y	12 days	Urgent results available within 1-2 hours of receipt at referral laboratory

	Ethylene Glycol - Serum or Lithium-heparin	Hospital Dudley Road Winson Green Birmingham B18 7QH				
TPMT	EDTA	Clinical Biochemistry City Hospital Dudley Road Birmingham B18 7QH	8407	Y	11 days	
Transferrin Glycoform Analysis	Serum or Lithium-heparin	Neuro-Immunology Laboratory Box 76 National Hospital for Neurology Queens Square London WC1N 3BG	8045	Y	19 days	
Trimethylamine	Urine	Clinical Biochemistry Sheffield Children's Hospital Western Bank Sheffield S10 2TH	10139	Y	52-94 days	
Urine Catecholamines	Contact laboratory	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	13 days	
Urine Citrate	24h urine with acid	Clinical Biochemistry & Immunology University Hospital of Wales Cardiff CF 14 4XW	8989	Y	20 days	
Urine Cortisol	24h urine without acid	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	23 days	
Urine Cystine	24h urine without acid	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	20 days	

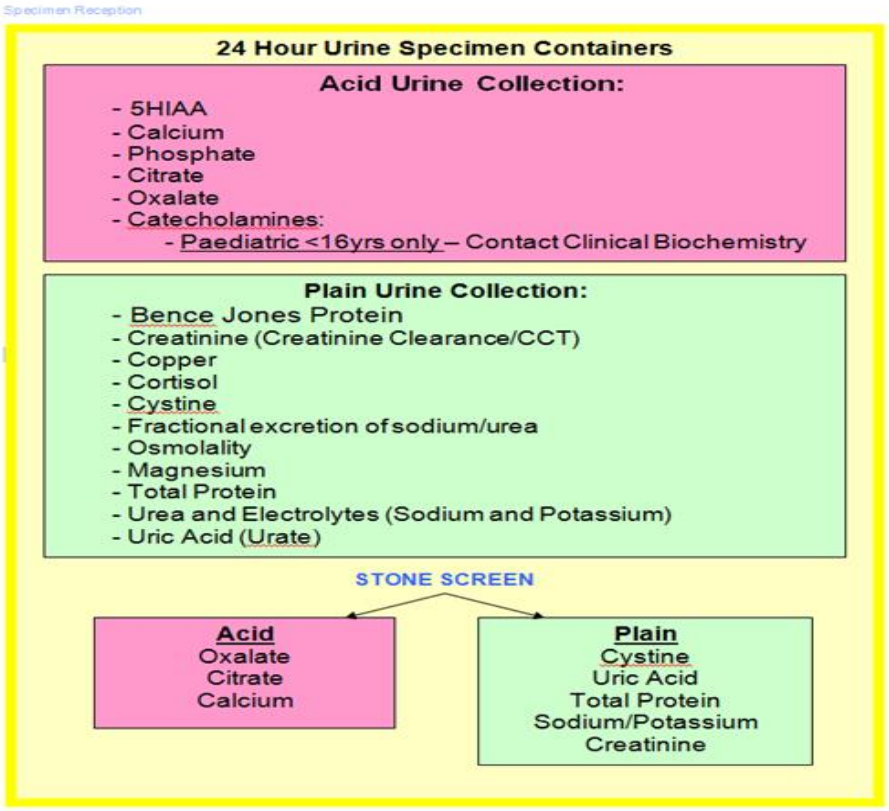
Urine Magnesium	Random urine or 24h urine without acid	Clinical Biochemistry Royal Liverpool University Hospital 4th Floor Duncan Building Prescot Street Liverpool L7 8XW	9785	Y	9 days	
Urine Organic Acids	Random urine, preferably EMU	Clinical Biochemistry Alder Hey Childrens NHS Foundation Trust Eaton Road Liverpool L12 2AP	9091	Y	15 days	
Urine Oxalate	24h urine with acid	Clinical Biochemistry & Immunology University Hospital of Wales Cardiff CF 14 4XW	8989	Y	20 days	
Urine Xanthine	24h urine without acid	Clinical Biochemistry 4th Floor North Wing St Thomas Hospital London SE1 7EH	9093	Y	31 days	
Very long chain fatty acids	Serum or Lithium-heparin	Clinical Biochemistry Sheffield Children's Hospital Western Bank Sheffield S10 2TH	10139	Y	38 days	
Vitamin A	Serum or Lithium-heparin	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	25 days	Sample must be protected from light
Vitamin E	Serum or Lithium-heparin	Clinical Biochemistry South Manchester Hospital Southmoor Road Wythenshawe Manchester M23 9LT	9063	Y	25 days	Sample must be protected from light
Voltage-gated calcium channel abs	Serum	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	29 days	

Voltage-gated calcium channel abs	CSF	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	N	29 days	
Voltage-gated potassium channel abs	Serum or CSF	Neuro-Biochemistry The Walton Centre for Neurology and Neurosurgery Lower Lane Fazakerley Liverpool L9 7JL	8642	Y	18 days	
White Cell Enzymes	EDTA	Willink Biochemical Genetics Unit St Mary's Hospital Oxford Road Manchester M13 9WL	9865	Y	31 days	

4.12. 24 Hour Urine Specimen Containers

24 Hour Urine Collection Container requirements for the following tests:

Please note for Urine Stone Screen require 2 separate 24 hour urine collection, one collected into plain container and another 24hour collection into Acid Container.



4.13. PATIENT INSTRUCTION/GUIDANCE FOR COLLECTION OF URINE AND FAECES SAMPLES

Please click here to view patient leaflet - instructions for collection of 24-hour urine sample.
Please click here to view patient leaflet – instructions for collection of 24-hour Urine Stones screen sample.

NHS Choice Website Guidance:

How to collect and store faeces samples – guidance for patients – please click here (link to NHS choice)

How to collect and store urine samples – guidance for patients – please click here (link to NHS choice)

4.14. Faecal Calprotectin

Please follow instruction on the link above for how to collect and store faeces samples. Please ensure samples are labelled with your full name, DOB, NHS/Hospital number, date and time sample was collected as a minimum.

4.15. MEASUREMENT OF UNCERTAINTY (BIOCHEMISTRY)

Definition of Measurement Uncertainty

Every chemical measurement has an error, which means that the measurement only gives an approximation of the true value of the quantity to be measured. Measurement uncertainty is defined as: 'A parameter, associated with the result of measurement that characterises the dispersion of the values that could reasonably be attributed to the measurand, and is therefore a quantitative indication of the analytical variability of a result'.

In Clinical Biochemistry, this concept relates to the analytical imprecision of the techniques used to produce quantitative results as a result of random effects on the assay system. Measurement uncertainty can be used to determine the significance of a change in serial patient values i.e. Whether the change is greater than can be attributed to analytical imprecision alone. Measurement uncertainty does not take into account measurement bias, which is assessed by external quality assurance (EQA) procedures.

4.16. Definition of Result Uncertainty

Result uncertainty is a broader concept that incorporates pre- and post- examination factors that may affect the results of a test, in addition to the analytical imprecision. Factors such as lipaemia, haemolysis and icterus that may affect patient results are checked for within the laboratory accordingly. Patient samples are also subject to technical validation to identify, where possible, the presence of interferences that could also cause false results, such as EDTA contamination.

Common sources of result uncertainty include sex, age, stress, food/drink, medical history, time of sample collection, site of collection, sample type and storage of sample. Information is provided elsewhere in the handbook to minimize the effects of some of these pre-examination factors. Please refer to:

Section 4.6	Spurious results due to inappropriate collection
Section 4.10	Specific specimen requirements for individual analytes

As many of these factors are patient specific or difficult to identify retrospectively, it is difficult to assign a quantitative value to the overall uncertainty of a result. However analytical imprecision of the assay may be combined with published data on the intra individual biological variation of the measurand to form an overall estimate of the effect of the biological and analytical variation on the result. Result uncertainty can be used in the same was as measurement uncertainty to determine the significance of a change in a patient's serial results.

4.17. Measurement and Result Uncertainty Estimation and Monitoring

Estimates of precision, measurement uncertainty and result uncertainty for all assays performed in Biochemistry are available, where possible. Please contact the Clinical Biochemist if you require this information. This data is updated and reviewed at regular intervals as part of the departments on-going monitoring of quality.

4.18. Traceability of Biological Interval/Reference Ranges

Biochemistry biological reference intervals are established from (in order of preference) National Guidelines or National Pathology Harmonisation ranges where available; manufacturers stated reference ranges; literature reviews or occasionally it may be necessary to employ clinical review of available information. Locally derived population studies are utilised were possible.

The Biochemistry Laboratory has defined the biological reference intervals for the tests reported by the department and has documented evidence for the basis of the reference intervals, and if requested, we are able to communicate this information to our users. Reference ranges are subject to clinical review and can change periodically, please therefore refer to the reference range stated on the patient's electronic/paper reports for age and sex specific reference ranges for your patient. If you would like any more information on our reference ranges then please contact the Biochemistry Laboratory via pathology.support@sthk.nhs.uk.

5. HAEMATOLOGY

5.1. CONTACT NUMBERS (Including Clinical Advice)

The Haematology department is open 24/7 please see page 2/3 and below for details on how to contact the department and requesting urgent sample.

St Helens and Knowsley – Whiston (Open 24 Hours per day)
Haematology: 0151 420 1838 Transfusion: 0151 430 1584

Please do not hesitate to call or visit the Transfusion Department for help or information.

Southport (Open 24 Hours per day)
Haematology enquires: 01704 70 4175 **Blood Transfusion enquiries: 01704 70 4176**
Ormskirk (Open Mon – Friday : 08:30 – 17:00hrs; Weekend and Bank Holidays 09:00 – 14:00hrs)
Ormskirk Site – contact Southport Site numbers as stated above

ODGH site offer limited on-site testing including some Haematology and urgent Transfusion. All other work is transported on scheduled transport to SDGH or Whiston site to process.

Routine enquires can be made by contacting the department Mon – Fri 09:00 – 17:00hrs

HAEMATOLOGY LABORATORY TELEPHONE	0151 430 1838
Consultant Haematologists Secretary Whiston	0151 430 **1825**
Consultant Haematologists Secretary Southport	01704 70 **4720**

5.2. Out of hours (OOHs)Transport of samples from Ormskirk to Southport/Whiston

When samples need to be sent to the laboratory out of hours from Ormskirk, please contact the porter on ext. 6153 or ascom 3751. The porters will collect and transport the samples on the appropriate transport method.

5.3. Haematology Clinical Advice

Clinical advice is available 24/7 and is available by contacting the Trust Switchboard
Routine enquires can be made Mon – Friday 09:00 – 17:00hrs by contacting the department on the numbers quoted above in section 5.1.

5.4. ROUTINE TESTS

See the table in sections below for specimen requirements, turnaround times and reference ranges. Some tests are performed as part of a combined profile from the same sample as indicated.

Click here to view the Procedure for Transportation of Specimens Reference:

Generic Blood Bottle Description	Sarstedt Blood Bottle Description SARSTEDT
FBC bottle (EDTA)	**Red** 2.7 ml
Coagulation (Citrate)	**Green** (Coag) 3.0 ml
Blood Transfusion (EDTA)	**Blue** 7.5 ml (Transfusion)
Antenatal Bloods (EDTA)	**Blue** 7.5 ml (Transfusion)

5.4.1. Full Blood Count

Specimen: Red EDTA bottle (K3) adult: 2.7 ml. Mix by inversion.

Parameters available include Hb, RBC, WBC, Diff, Plt, Hct, MCV, MCH, MCHC and RDW.

5.4.2. Other Tests Available Using the Same Specimen

Blood Film (+ differential WCC)	This is carried out when results from analyser or clinical information show it to be necessary or on request
Malarial Parasites	
Glandular Fever	
Reticulocyte count	
Sickle test	Results will be confirmed by Hb electrophoreisis, family history may be helpful if available.
Hb electrophoresis	Family history or ethnic origin maybe helpful if available.
Antenatal haemoglobinopathy screening	Family Origin Questionnaire (FOQ) required for booking bloods
ESR	Minimum of 2 ml sample needed, paediatric volume will be insufficient

5.5. COAGULATION TESTS

Specimen: Green (citrate) 3.0 ml. Mix by inversion.

Sample bottles MUST be filled to the volume indicator line

N.B. Blood obtained by clean venepuncture without clotting or tissue-juice contamination. **Accurate volume is critical** otherwise sample will not be processed. **Do not underfill or overfill**

5.5.1. Coagulation

- Prothrombin time (INR)
- Activated Partial Thromboplastin time (APTT)
- Fibrinogen
- D-dimer

Please specify if patient is on anticoagulant therapy.

5.5.2. Clotting Factor Assays

Please contact the laboratory before sending.

One 10 ml green citrate tube required or 3 small green.

5.5.3. Thrombotic Screen

Protein S, C, AT III, Lupus, ACA, B2GPI, Factor V Leiden and Prothrombin Gene Mutation

One 10.0 ml green citrate tube required or 3 small green. .

Thrombotic screen during the acute phase is unreliable. If patient is on anticoagulants, Proteins, C, S and lupus anticoagulant will not be done as results will be inaccurate.

5.5.4. Platelet Function Screening Tests

Please contact laboratory staff before requesting.

5.6. CONTROL OF ANTIGOAGULANT THERAPY

5.6.1. Anticoagulant Clinics at Whiston

If patients require to see a Nurse/Clinician, they should attend the following times:

Whiston:	Tuesday	1.30 pm – 4.00 pm	Outpatients Dept.
St Helens:	Monday	9.00 am – 11.00 am	Diagnostic Treatment Centre

Patients for Warfarin monitoring who do not need to see a clinician may attend with their **yellow books** to:

St Helens Phlebotomy Room
Mon to Fri 8.30 am – 3.30 pm

or to

Whiston Phlebotomy Room
Mon to Thurs 9.00 am – 3.00 pm
Fri 9.00 am – 1.00 pm

New patients should be referred using the correct request form or a letter containing full details of the reason for and duration of therapy, the drug used and dosage, and any other relevant history and medication.

5.6.2. Anticoagulant Clinics at S&O

Ormskirk Anticoagulant Clinics are held in the Outpatient Department at Ormskirk Hospital and times are as follows:

Tuesday afternoons from 1.15 pm to 2.45 pm
Wednesday mornings from 8.30 am to 10.45 am

Southport Anticoagulant Clinics are held in the Outpatient Department at Southport Hospital and times are as follows:

Tuesday mornings from 9.00 am to 11.30 am
Friday mornings from 10.00 am to 11.30 am
Friday afternoons from 1.30pm to 3.15 pm

Patients should attend Anticoagulant Clinic no earlier than 10 minutes before their appointment time and will be seen in appointment time order. Ambulance patients will be seen as soon as possible after arrival at clinic, irrespective of their appointment time.

All patients will have an anticoagulant blood check by finger-prick and see a Pharmacist or Biomedical Scientist, as appropriate, to be advised about their anticoagulant dose and next appointment.

New patients should be referred to the Anticoagulant Service at Southport Hospital Pharmacy Department using the correct request form or a letter containing full details of the reason for and duration of therapy, the drug used and dosage, and any other relevant history and medication.
Whenever possible, one member of the Pharmacy team and 2 members of the Medical Laboratory Sciences team will be present at each clinic to provide the service.
Contact detail for S&O Pharmacy team and appointments: Tel 01704 704118

5.7. SPECIAL TESTS

Bottle Collection System	SARSTEDT
Bone marrow aspirate biopsy	**Contact Haematology Medical Staff**
Glucose 6 phosphate Dehydrogenase	**2.7 ml EDTA**
PNH Screening Test (Paroxysmal nocturnal hemoglobinuria)	**2.7 ml EDTA RED K3)**

5.8. HIGH RISK SPECIMENS

Please bag every specimen separately i.e. one bag/one specimen with high-risk label. Where patients are new it would be helpful to telephone Haematology and indicate reason for 'risk' status. Patients with Multiresistant organisms are not considered high risk for Haematology.

5.9. HAEMATOLOGY BIOLOGICAL/REFERENCE INTERVALS

Biological Reference Intervals (Reference Range) are subject to be review and change periodically, please therefore refer to those stated on both electronic and paper reports as current in use ranges.

5.9.1. Haematology FBCs Biological Reference Interval

PARAMETER	AGE												
	1 DAY	3 DAYS	1 WEEK	1 MONTH	2 MONTHS	6 MONTHS	2 YEARS	4-7 YEARS	8-14 YEARS	18 YEARS F	18 YEARS M	60 YEARS F	60 YEARS M
Hb (g/L)	140 - 220	140 - 220	125 - 210	100 - 170	90 - 135	100 - 141	100 - 148	100 - 148	115 - 158	115 - 165	130 - 175	118 - 148	133 - 167
WBC (10^9/L)	9.0 - 18.4	9.0 - 18.4	5.0 - 18.4	5.0 - 18.0	5.0 - 18.0	5.0 - 17.0	5.0 - 17.0	6.3 - 16.2	4.9 - 13.7	3.9 - 11.1	3.7 - 9.5	3.9 - 11.1	3.7 - 9.5
Platelets (10^9/L)	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450	150 - 450
RBC (10^{12}/L)	3.8 - 6.5	3.8 - 6.5	3.2 - 6.4	2.8 - 5.3	2.6 - 4.3	3.6 - 5.3	4.0 - 5.0	4.0 - 5.0	4.0 - 5.2	3.8 - 5.8	4.5 - 6.0	3.8 - 5.8	4.5 - 6.0
HCT	0.45-0.67	0.45-0.67	0.39-0.66	0.31-0.55	0.28-0.42	0.30-0.41	0.31-0.43	0.31-0.43	0.34-0.47	0.37-0.47	0.40-0.52	0.37-0.47	0.40-0.52
MCV (fL)	98 - 130	94 - 130	88 - 120	85 - 120	77 - 115	72 - 95	73 - 90	74 - 88	76 - 92	78 - 102	78 - 102	78 - 102	78 - 102
MCH (pg)	31.0 - 39.0	30.0-37.0	28.0-37.0	27.0 - 36.0	26.0 - 34.0	24.0 - 33.0	23.0 - 32.0	25.0 - 32.0	25.0 - 33.0	25.6 - 34.8	25.6 - 34.8	25.6 - 34.8	25.6 - 34.8
MCHC (g/L)	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360	310 - 360
NEUT (10^9/L)	4.8 - 17.1	2.0 - 9.4	1.7 - 9.0	1.0 - 9.0	1.0 - 9.0	1.0 - 8.5	1.5 - 8.5	1.6 - 9.0	1.8 - 7.5	1.8 - 7.5	1.8 - 7.5	1.8 - 7.5	1.8 - 7.5
LYMPH (10^9/L)	2.0 - 7.3	2.0 - 7.3	2.8 - 9.1	3.0 - 13.5	3.0 - 13.5	4.0 - 13.5	3.0 - 9.5	2.2 - 9.8	1.9 - 7.6	1.0 - 4.0	1.0 - 4.0	1.0 - 4.0	1.0 - 4.0
MONO (10^9/L)	0.1 - 1.9	0.1 - 1.9	0.1 - 1.7	0.1 - 1.7	0.1 - 1.7	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0
EOSIN (10^9/L)	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.8	0.0 - 0.4	0.0 - 0.4	0.0 - 0.4	0.0 - 0.4
BASO (10^9/L)	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
NRBC (10^9/L)	0.02	0.02	0.02										
RETICS (%)	3.0 - 7.0	1.0 - 3.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0	0.2 - 2.0

Haematology Biological/Reference Interval checked Feb 2021.

5.9.2. Haematology Other Biological/Reference Interval

Haematology Biological/Reference Interval checked Sept 24 ; please refer to test reports for current reference intervals as these will be subject to age and sex related ranges.

PARAMETER	MALE REFERENCE RANGES	FEMALE REFERENCE RANGES
ESR	17-50 yrs: 0-10 mm/s	17-50 yrs:0–12 mm/s
	51-60 yrs: 0-12 mm/s	51-60 yrs:0–19 mm/s
	>60 yrs: 0-20 mm/s	>60 yrs: 0-30 mm/s
PT/INR	9-12 s / 0.9-1.3	9-12 s / 0.9-1.3
APTT	20–30 s / 0.8-1.2	20–30 s / 0.8-1.2
D-Dimer	<50 yrs < 500 ng/mL	<50 yrs < 500 ng/mL
	>50 yrs < Age x 10 ng/mL	>50 yrs < Age x 10 ng/mL
Fibrinogen	1.5 - 4.5	1.5 - 4.5
FV Leiden	Normal (Wild type): Mutation not detected	Normal (Wild type): Mutation not detected
PTGENE	Normal (Wild type): Mutation not detected	Normal (Wild type): Mutation not detected
Protein C	70 – 140 %	70 – 140 %
Protein S	68 – 139 %	60 – 114 %
AT III	75-125 %	75-125 %
IgG	Negative:<10	Negative:<10
	Positive (clinically insignificant): 10-23.8	Positive (clinically insignificant): 10-23.8
	Positive: 23.8-80	Positive: 23.8-80
	Strong positive:>80	Strong positive: >80
IgM	Negative:<10	Negative:<10
	Positive (clinically insignificant): 10-29.9	Positive (clinically insignificant): 10-29.9
	Positive: 29.9-80	Positive: 29.9-80
	Strong positive: >80	Strong positive: >80
B2GPI	Negative:<7	Negative:<7
	Positive (clinically insignificant):7-17.7	Positive (clinically insignificant):7-17.7
	Positive: >17.7	Positive: >17.7
Screening Test for Lupus	Not detected:<1.2	Not detected:<1.2
Confirmation Test for Lupus	Not detected:<1.2	Not detected:<1.2
Lupus sensitive APTT	24–35 s	24–35 s
vWF Activity	Abnormal < 30%	Abnormal < 30%
	Values > 30%: do not rule out possible variants of Von Willebrand Syndrome	Values > 30%: do not rule out possible variants of Von Willebrand Syndrome
Vw Antigen	Normal: 50 – 150%	Normal: 50 – 150%
FII	Normal: 50 – 150%	Normal: 50 – 150%
FV	Normal: 50 – 150%	Normal: 50 – 150%

FVII	Normal: 50 – 150%	Normal: 50 – 150%
FVIII	Normal: 50 – 150%	Normal: 50 – 150%
FIX	Normal: 50 – 150%	Normal: 50 – 150%
FX	Normal: 50 – 150%	Normal: 50 – 150%
FXI	Normal: 50 – 150%	Normal: 50 – 150%
FXII	Normal: 50 – 150%	Normal: 50 – 150%
Hb A2	2.2 – 3.5%	2.2 – 3.5%
Hb F	<1.0%	<1.0%

5.9.3. Paediatric Reference Ranges for Coagulation *

PARAMETER	FROM 0 DAYS	FROM 3 DAYS	FROM 1 MONTH	FROM 3 MONTH	FROM 6 MONTH	FROM 1 YEAR
PT (seconds)	8.6 – 13.5	8.1 – 13.0	7.9 – 12.0	8.2 – 12.1	9.1 – 11.8	9.8 – 11.4
APTT (seconds)	25.4 – 44.1	23.8 – 45.2	20.7 – 44.7	19.5 – 40.6	22.8 – 34.7	24.2 – 30.2
Fibrinogen g/L	1.6 – 3.8	1.6 – 4.4	1.6 – 3.6	1.1 – 3.6	1.1 – 3.7	1.8 – 3.5
Thrombin Time (seconds)	13.1 – 19.8	11.9 – 20.4	13.6 – 20.4	14.4 – 20.8	13.9 – 21.8	15.6 – 19.6

5.10. SPECIMEN INFORMATION

BLOOD TEST	BLOOD BOTTLE	TURNAROUND	REFERENCE RANGES	COMMENT
Full Blood Count	Red 2.7 ml EDTA (K3)	< 4 hrs	See Section 5.9	Includes Hb, RBC, WCC, Diff, HCT, MCV, MCH, MCHC, RDW
ESR	Red EDTA 2.7 ml (K3)	< 8 hrs	See Section 5.9	Not done on paed tubes for adults – Minimum 2 ml required
Blood Film	Red EDTA 2.7 ml (K3)	< 2 days		3 days at weekend
Malaria Parasites	Red EDTA 2.7 ml (K3)	Screen < 6 hrs Morphology < 24 hrs		Travel history is helpful if available
Reticulocyte count	Red EDTA 2.7 ml (K3)	< 4 hrs	0.2 - 2.00% (10-100 x 10^9/L)	
Infectious Mononucleosis screen (Glandular Fever)	Red EDTA 2.7 ml (K3) or brown top serum sample	< 4 hrs		
Sickle Test	Red EDTA 2.7 ml (K3)	< 4 hrs		Family history + ethnic origin are helpful if available. Positive results confirmed by electrophoresis.
Haemoglobinopathy Screening	Red EDTA 2.7 ml (K3)	3 working days		Family history + ethnic origin are helpful if available. Positive results confirmed by electrophoresis. Family Origin Questionnaire (FOQ) required for booking bloods.
COAGULATION	2.9 ml green citrate Paediatric 1.4 ml			Paediatric tubes to be used on paediatric patients or in adults in exceptional circumstances only. Please state if on anticoagulants.

BLOOD TEST	BLOOD BOTTLE	TURNAROUND	REFERENCE RANGES	COMMENT
Prothrombin Time *	2.9 ml green citrate	< 4 hours	9-12 sec	Sample must be correct level i.e. neither over or under filled.
INR	2.9 ml green citrate	< 4 hrs	2.0 – 4.0 (Oral anticoagulant)	Sample must be correct level i.e. neither over or under filled.
APTT (PTT)*	2.9 ml green citrate	< 4 hrs	20 – 30 seconds	Sample must be correct level i.e. neither over or under filled.
Fibrinogen*	2.9 ml green citrate	< 4 hours	1.5- 4.5g/l	Not routinely tested.
Thrombin Time*	2.9 ml green citrate	< 4 hrs	1.0-1.2 ratio	Not routinely tested.
D-Dimer	2.9 ml green citrate	< 4 hrs	<50yrs <500ng/ml >50 yrs < Age x 10ng/mL	Please provide a wells score
Thrombotic Screen	10.0 ml green citrate	< 3 weeks	Refer to report	Testing during the acute phase of a thrombosis is unreliable. If patient is on Warfarin then PC, PS and Lupus will not be tested.
Protein C				
Protein S				
Antithrombin				
Factor V Leiden				
Beta 2 Glycoprotein I				
Prothrombin Gene Mutation	10.0 ml green citrate	< 3 weeks	Refer to report	Sample must be correct level, i.e. neither over or under filled.
Lupus Anticoagulant				
Anticardiolipin Antibodies				

BLOOD TEST	BLOOD BOTTLE	TURNAROUND	REFERENCE RANGES	COMMENT
CLOTTING FACTOR ASSAYS	One 10.0 ml green citrate tube	< 4 hrs if urgent or < 2 weeks if not urgent	50-150%	By arrangement only – Contact Laboratory
Factors: II, V, VII, VIII, IX, X, XI, XII			50-150%	
Intrinsic Assays: FVIII, IX, X, XI, XII			50-150%	
Extrinsic Assays: FII, V, VII, X			50-150%	
vWF Assay (Von Willebrand Factor)		< 4 hrs if urgent or < 2 weeks if not urgent		By arrangement only – Contact Laboratory
Platelet Function Tests	3 ml green citrate tube			By arrangement only – Contact Laboratory
Heparin Anti XA	3ml green citrate tube	<4 hrs if urgent <1 week if not urgent		By arrangement only – Contact Laboratory
DOAC Assays **Apixaban** **Rivaroxaban** **Edoxaban**	3ml green citrate tube	< 4hrs if urgent <1 week if not urgent	 30 – 500 ng/mL 30 – 500 ng/mL 30 – 500 ng/mL	By arrangement only – Contact Laboratory
SPECIAL TESTS				
Glucose-6-Phosphate Dehydrogenase	2.7 ml EDTA	2 days		Sample sent to Royal Liverpool
PNH Screening Test	Red EDTA 2.7 ml/ Red EDTA 1.2 ml Paed only	< 2 weeks		Sample sent to Royal Liverpool
Bone Marrow Aspirate/Biopsy	Bedside Procedure			Contact Haematology Medical Staff – by arrangement
Hereditary spherocytosis screening test	2.7 ml EDTA	3 days		Sample sent to Alder Hey

DOAC – Direct oral anticoagulant

5.11. Guidance for requesting antenatal Sickle cell and Thalassaemia screening (SCT) and consent

All antenatal screening samples must complete Family Origins Questionnaire (FOQ) where informed consent for the SCT screening can be recorded (see section 5.16).

Data field	Information required for antenatal screening request
Type of sample	Sample should be identified as ANTENATAL SAMPLE Red bottle EDTA 2.7 ml (K3) for sickle cell Red EDTA 2.7 ml (K3) **Haemoglobinopathies** Screening including Thalassemia screening
Identification of the pregnant women	Request form and sample must be labelled with 3 patient identifiers **1. First and Last Name** **2. Date of Birth** **3. NHS Number and/or Hospital Number** Address should be provided and may be accepted as 3rd identifier if NHS number or hospital number not available. Samples must be completed with same identifiers as on the request form **Please note sample will be rejected if request form and samples are not identified with 3 patient identifiers.**
Name/location of requesting individual and where to send the results	Name if person completing request Location of requester – ANC/GP surgery etc. Maternity unit booked for delivery Results & report to name and location is different to that stated above
Name date and time of specimen	• Name and location of person taking the sample • Date and time of sample collection
Family Origin Questionnaire	Completed Family Origin Questionnaire must be sent with any request including patient details, family origin of both parents and signed by requestor.

TAT for Antenatal Sickle cell and Thalassaemia screening (SCT)

TAT	Sickle Cell	<4 hours
	Thalassaemia /Haemoglobinopathies	3 days working days

5.12. REFERRAL LABORATORIES

Please contact department if test is not listed below or you require further information.

Organisation	Referred Test	UKAS ID	Included in scope of accreditation to ISO15189	TAT	Sample Type	Special instructions/comments
Haemato-Oncology Diagnostic Service (HODS) Laboratory, Royal Liverpool University Hospital, Immunophenotyping HODS Laboratory Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB) Mount Vernon Street, Liverpool, L7 8YE Telephone no: 0151 706 4334 Email: HODSenquiries@rlbuht.nhs.uk Email: cytogenetics.oncology@lwh.nhs.uk Email: dna.liverpool@nhs.net	Bone Marrow	9785	Yes	10 days	All bone marrow requests will have a total of 3 EDTA samples. One for Whiston/Southport for morphology and two for HODS – testing and storage.	
HODS Laboratory Royal Liverpool University Hospital, Immunophenotyping	HODS Immunophenotyping / Cell Markers (Adult patients) 0151 706 4334	9785	Yes	7 days	Bone marrow or 2.7ml blood in EDTA bottle. 2.7ml EDTA Blood/3ml EDTA Bone Marrow	

HODS Laboratory Royal Liverpool University Hospital, Immunophenotyping	Immunophenotyping - Markers	9785	Yes	7 days		
HODS Laboratory Royal Liverpool University Hospital, Immunophenotyping	PNH - Paroxysmal Nocturnal Hemoglobinuria	9785	Yes	72 hours	2.7 ml blood in EDTA	The sample must arrive within 72 hours of collection.
Royal Liverpool - Specials Coagulation Haematology Royal Liverpool Hospital Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB) Mount Vernon Street, Liverpool, L7 8YE Telephone no: 0151 706 4320 Telephone Out of Hours: 0151 706 4330 Fax: 0151 706 5810	Heparin Induced Thrombocytopenia (HIT)	9785	Yes	Next working day	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at RLH within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport (by lab).
Royal Liverpool - Specials Coagulation	ADAMTS 13 - A Disintegrin and metalloproteinase with a ThromboSpondin type 1 motif, member 13	9785	Yes	Next working day (urgent) 7 days	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at RLH within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport (by lab).
Royal Liverpool - Specials Coagulation	Factor XIII	9785	Yes	3 weeks	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at RLH within 4 hours of collection. If the

						sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport (by lab).
Royal Liverpool - Specials Coagulation	Factor VIII and XI Inhibitors	9785	Yes	3 weeks	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at RLH within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport (by lab).
Royal Liverpool - HODS - Molecular Biology HODS Laboratory Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB) Mount Vernon Street, Liverpool, L7 8YE Telephone: 0151 706 4326 Email: HODSenquiries@rlbuht.nhs.uk Email: cytogenetics.oncology@lwh.nhs.uk Email: dna.liverpool@nhs.net	BCR-ABL	9785	Yes	14 days	7.5 ml blood in EDTA (Transfusion bottle	Sample must be received in the lab before 4pm on a Friday
Royal Liverpool HODS – Molecular Biology	APL - Acute Promyelocytic Leukaemia Workup	9785	Yes	2 weeks	1ml EDTA Bone Marrow	

Royal Liverpool HODS – Molecular Biology	AML - Acute Myeloid Leukaemia Workup	9785	**Yes**	2 weeks	1ml EDTA Bone Marrow	
Royal Liverpool HODS – Molecular Biology	NPM1	9785	Yes	2 weeks	1ml EDTA Bone Marrow	
Royal Liverpool HODS – Molecular Biology	CLL MRD - Chronic Lymphocytic Leukaemia Minimal Residual Disease	9785	**Yes**	7 days	1ml EDTA Bone marrow or peripheral blood.	
Royal Liverpool HODS – Molecular Biology	MYD88 L265P	9785	**Yes**	2 weeks	1ml EDTA Bone Marrow/5ml EDTA Blood.	Sample must be receipted by referral lab within 48 hours of sampling
Royal Liverpool – Immunology Liverpool Clinical Laboratories Clinical Immunology Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB), Mount Vernon Street, Liverpool, L7 8YE Telephone: 0151706 4380	T & B subsets (CD counts)	9747	Yes	3 days	2.7ml blood in EDTA	
Royal Liverpool – Haematology Address and contact: Liverpool Clinical Laboratories Haematology Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB), Mount Vernon Street, Liverpool, L7 8YE	G6PD Glucose-6-Phosphate Dehydrogenase	9785	Yes	4 days	2.7ml blood in EDTA	A recent haematocrit must have been requested

Telephone no: 0151 706 4320 Telephone Out of Hours: 0151 706 4330 Fax: 0151 706 5810						
Liverpool Women's Genetics Laboratory Liverpool Centre for Genomic Medicine, Liverpool Women's NHS foundation trust, Crown street, Liverpool, L8 7SS. Telephone number: 0151 702 4228	Chromosomes	9322	Yes	21 days (urgent 14)		
Liverpool Women's - HODS Cytogenetics Laboratory HODS Laboratory Specimen Reception, 3rd Floor Clinical Support Services Building (CSSB), Mount Vernon Street, Liverpool, L7 8YE. Telephone no: 0151 706 4334 Email: HODSenquiries@rlbuht.nhs.uk Email: cytogenetics.oncology@lwh.nhs.uk Email: dna.liverpool@nhs.net	FISH (BCR-ABL) Fluorescence in-situ hybridisation	9322	Yes	21 days (urgent 14)	Specimen required is 10ml blood in Lithium Heparin or 2ml Bone Marrow in culture media ordered from the Cytogenetics department. (Kept in haematology fridge)	
Liverpool Women's - HODS Cytogenetics Laboratory	FISH (CLL- Chronic Lymphocytic Leukaemia) Fluorescence in-situ hybridisation	9322	Yes	21 days (urgent 14)	Specimen required is 5ml blood in EDTA and 5ml blood in Lithium Heparin.	
Liverpool Women's **HODS Molecular Genetics**	JAK2 Janus kinase 2	9322	Yes	14 days	7.5ml blood in EDTA	
Liverpool Women's **HODS Molecular Genetics**	CALR Calreticulin	9322	No not in scope	2 weeks	7.5ml blood in EDTA.	

Liverpool Women's **HODS Molecular Genetics**	MPL Codon 515 Mutations	9322	No not in scope	2 weeks	7.5ml blood in EDTA	
Liverpool Women's **HODS Molecular Genetics**	Exon 12	9322	No not in scope	3 weeks	7.5ml blood in EDTA	
Alder Hey – Haematology Alder Hey Children's Hospital Haematology Department Alder Hey Hospital, Eaton Road, West Derby, Liverpool, L12 2AP Tel: 0151 228 4811 Fax: 015 252 5493	Immunophenotyping / Cell Markers (for children)	9091	Yes	24 hours	2.7ml blood in EDTA	
Alder Hey – Haematology	Eosin -5- maleimide 5-EMA Dye binding test for Spherocytosis (5-EMA)	9091	No not in scope	3 days	2.7ml blood in EDTA	FBC result and carry out a Reticulocyte count on the sample before sending.
Alder Hey - Coagulation	Non-Accidental Injury (NAI) Screen Clotting screen (APTT and PT done at Whiston) Factor VIII Von Willebrand antigen, activity Factor XIII	9091	Yes	2 weeks	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at Alder Hey within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and

						frozen prior to transport (by lab).
Alder Hey - Haematology	T & B subsets	9091	Yes	24 hours	2.7ml blood in EDTA	
Alder Hey - Haematology	Reptilase Time	9091	Yes	1 hour	Citrated Plasma in a 3ml coagulation bottle	The sample must be received at Alder Hey within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport (by lab).
Liverpool School of Tropical Medicine The Clinical Diagnostic Parasitology Laboratory Pembroke Place, Liverpool, L3 5QA Tel: 0151 705 3220 Fax: 0151 702 3370	Malaria/Blood Borne Parasites	9362	Yes	24 hours	2.7ml blood in EDTA	Unstained thick and thin films to be sent by lab with sample
Trafford General Hospital- Red Cell Laboratory, Haematology Haematology Department Trafford General Hospital Moorside Road M14 5SL	Isoelectric focusing Detection of abnormal Haemoglobinopathies	8650	Yes	72hrs	2.7ml blood in EDTA	Done at Haematology department at Manchester University NHS Foundation Trust

Tel 0161 9348765						
Manchester Royal Infirmary **Manchester Haemoglobinopathy Diagnostic Service** Oxford Road, Manchester, M13 9WL. Tel: 0161 276 5990/4809.	Haemoglobinopathies Genetic Studies	8650 /9865	Yes	Urgent – 3 days Routine – 14 days Report 42 days	5-10ml EDTA sample labelled with surname, forename, DOB, hospital number and date & time of collection is required	A request and signed consent form must be sent with the sample before testing will be performed. See http://www.mft.nhs.uk/haemoglobinopathy for required forms
Manchester Royal Transplantation Laboratory 2nd Floor Purple Zone Manchester Royal Infirmary Oxford Road Manchester M13 9WL Tel: 0161 276 6471	HLA-B27 Human Leucocyte Antigen B27	7878	Yes	5-7 days	3ml EDTA (minimum volume = 1ml).	Do not refrigerate sample
Manchester Royal - Coagulation Laboratory Department of Haematology, Manchester Royal Infirmary, Oxford Road, Manchester, M13 9WL Tel: 0161 701 2123	Dabigatran	8650	Yes	24 hours	Citrated Plasma 3ml coagulation bottle	The sample must be received at MRI within 4 hours of collection. If the sample cannot reach the laboratory within 4 hours the sample must be centrifuged at 3000g for 10 mins, separated and frozen prior to transport. (By Lab)
Leeds General Infirmary *Institute of Pathology* *Leeds General Infirmary* *Great George Street* *Leeds*	Trials	9305	NA	4 days	6 unstained bone marrow slides taken at diagnosis	Contact Haematology for further information

LS1 3EX						
Synnovis (ViaPath Lab) (at King's College Hospital Ground Floor Bessemer Wing King's College Hospital Denmark Hill London SE5 9RS Tel 0203 299 2455	Pyruvate Kinase	8674	No not in scope	14 days	2.7 ml of blood in EDTA (adult) or 1.2 ml EDTA (paediatric)	Only sent Mon - Wed
University College Hospital - Department of Haematology- Cytogenetics Gower Street London WC1E 6AU	Cytogenetics Trials	NA	NA	Not specified		Arranged usually by Trial coordinator
Acute lymphoblastic leukaemia MRD Service Part of Specialist Integrated Haematological Malignancy Diagnostic Service (SIHMDS) 3rd floor, Pathology and Pharmacy Building, Royal London Hospital, 80 Newark Street, London, E1 2ES Tel: 0203 2460142	Minimal Residual Disease MRD	8285	NA	Not specified	30mls of heparinised blood	
Guys and St Thomas Hospital - Molecular Oncology Diagnostics Unit Clinical Laboratory Services 4th Floor, Southwark Wing, Guy's Hospital Great Maze Pond, London SE1 9RT Tel: 020718 84784	Molecular Monitoring – APL only	8710	NA	Not specified	Send 20 ml EDTA blood or 2 - 3 ml Bone Marrow after first course of treatment (18-23 days).	Usually, the Haematology Trials Coordinator will deal with this
Southern General Hospital Department of Molecular Diagnostics (MRD	MRD	8290	NA	28 days	Bone Marrow in EDTA	

Group) Level 2 Southern General Hospital Govan Road Glasgow G51 4TF	Minimal Residual Disease (MRD)				5 – 10ml blood (when WCC > $20x10^6$) in EDTA tube 3 – 5ml bone marrow in EDTA tube Trephine – in transport media	

5.13. MEASUREMENT OF UNCERTAINTY (HAEMATOLOGY AND TRANSFUSION)

Uncertainty of measurement is a quantitative indication of the analytical variability of a result. The uncertainty may need to be taken into account when interpreting data. Systematic assessment of the factors influencing the result and of the uncertainty forms a key part of method validation.

In laboratory testing there are potential "uncertainties" that may affect test results (for example, specimen not collected correctly, sample transport delays, presence of antimicrobials, biological variation). Additionally factors within the laboratory may lead to variation (for example, incubation times, storage conditions, environmental conditions and other laboratory factors).

The Haematology and Transfusion laboratory has measures in place to minimise these level of uncertainty in any test result and also participates in internal and external Quality Assurance.

All results provided by the Haematology and Transfusion Laboratory are representative of the sample tested and results must always be considered against clinical presentation.

The department periodically reviews and measure elements that may contribute to uncertainty of Haematology and Transfusion result, please contact the department for further information.

5.14. Traceability of Biological Interval/Reference Ranges

Haematology biological reference intervals (reference ranges) are established from a number of methods, such as locally derived studies on patient populations, literature reviews, manufacturers reference ranges and national guidance. The Haematology Laboratory has defined the biological reference intervals for the tests reported by the department, and has documented evidence for the basis of the reference intervals, and if requested, we are able to communicate this information to our users. Reference ranges are subject to clinical review and can change periodically, please therefore refer to the reference range stated on the patient's electronic/paper reports for age and sex specific reference ranges for your patient. If you would like any more information on our reference ranges then please contact the Haematology Laboratory via **pathology.support@sthk.nhs.uk**.

5.15. HAEMATOLOGY ACTION LIMITS FOR PHONING URGENT RESULTS

The following is the Haematology department's action limits for phoning urgent results. This should be used for guidance only. There are a number of factors that are also looked into when phoning through urgent results to a medical officer; these include looking at the patient history and clinical details for example. These action limits would not apply with patients in cases where there is consistency with historical results.

Test	Action limit
Haemoglobin	< 70 or > 200 g/L
White Blood Count	< 3.0 x 10^9/L
Platelets	<30.0 or >1000 x 10^9/L
Neutrophils	< 0.5 x > 50 x 10^9/L
Glandular Fever Screen	POSITIVE
Sickle Screen	POSITIVE
Malaria Screen	POSITIVE
INR	> 5.0
APTT Ratio	> 2.0

5.16. Antenatal Screening Samples Requirements and consent.

Antenatal samples received in the Haematology Lab with an Family Origins Questionnaire (FOQ) that has incomplete family origin history (no information on mother and/or father's family origin) or insufficient/incorrect patient details, will not have HbElec performed. The family history is essential for screening purposes and for interpretation of results.

Consent for the screening must be recorded on the consent section of FOQ (pink box at the bottom). Patient must sign and the 'requestor signature' at the top of the form must be signed.

FOQs not signed by the healthcare professional filling the form confirming that the patient has been informed about this test, will not have a HbElec test performed.

Booking samples received with a sickle and thalassaemia screen requested without an FOQ will not have HbElec performed, as there is no record of consent or a family history to interpret the results.

5.17. CSF Samples for Haematology

CSF samples requiring immunophenotyping please contact the laboratory for instructions and TAT.
CSF samples for cytospin and staining please contact the laboratory for instructions and TAT.

Please note both of the CSF tests above will require authorisation for testing by consultant Haematologist.

5.18. Haematology Spurious results

PROBLEM	COMMON CAUSES	CONSEQUENCES
Delay in receipt of sample	Overnight storage delay in transit	Increased MCV and decreased MCHC leading to sample rejection. Degeneration of cellular elements of blood cells – unable to correctly review results and blood film morphology. Cause pseudo-thrombocytopenia (falsely low platelet count) leading to the inability to report platelet count. Heparin samples must be received within one hour of collection, delay in doing so will lead to falsely low counts and sample rejection. Platelet function testing must be completed within 4 hours, failure to notify laboratory of testing and delay will lead to sample rejection.
Clotted samples	Incorrectly mixed samples post collection.	This can lead to grossly abnormal results including – extremely low platelet count, white cell count and Hb. This could lead to misdiagnosis of the patient and unnecessary additional testing to confirm results.
Storage	Storing at 4^{o}C	Some samples which require further testing are required to remain at room temperature and should not be fridged, leading to rejection of testing for that test.
Haemoconcentration of blood sample	Taking sample in syringe and leaving to stand before placing in specimen bottle	It can falsely increase or decrease Hb, WBC, Platelets depending on what has been placed into the specimen bottle. The results would have to be rejected.
Haemolysis	Expelling blood through needle into tube over vigorous mixing of specimen storing specimen in freezer (-20^{o}C) excessive delay in transit leaving specimen in hot environment	For haemolysed samples at MWL, affected tests will not be reported depending on degree of haemolysis. This is particularly important in Coagulation were a number of assays are unable to be reported due to even mild haemolysis. For very grossly haemolysed samples **no** results will be reported.

Inappropriate sampling site	Specimen taken from drip arm	Abnormally decreased Hb, Hct, and potential to dilute other parameters Dilutional effect
Incorrect container or anticoagulant	EDTA tube sent for coagulation or transferring blood form one tube to another Gel beads in red EDTA/Citrate sample	Unable to process samples due to potential to invalidate results – e.g. EDTA contains Calcium, if this was mixed with a sodium citrate sample used for coagulation it would initiate the coagulation clotting process and cause abnormal results. Gel mixed into EDTA samples can lead to analyser failure as this can block analyser probes leading to incorrectly reported results and costly analyser downtime which could effect the Trust in delayed results.
Podding samples	Sending samples which should not be podded in the POD	Platelet function tests should not be podded due to the effect it can have on the platelets prior to specialist testing. Samples will be rejected if sent in POD
Lipaemia	Specimen taken after a fatty meal	This could impact on the full blood count results by effecting a number of the red cell parameters leading to them being grossly abnormal and unable to be reported. In coagulation, it will prevent the analytical equipment from being able to detect clot formation and so results will be inaccurately increased. Specimens would have to be rejected.

5.19. Transfusion Spurious results

PROBLEM	COMMON CAUSES	CONSEQUENCES
Haemolysis	Expelling blood through needle into tube Over vigorous mixing of specimen Storing specimen in freezer (-20°C) Excessive delay in transit to testing laboratory Leaving specimen in hot environment	We are unable to provide any results from Transfusion samples that are haemolysed. A repeat sample would be requested resulting in possible transfusion delays.
Inappropriate sampling site	Specimen taken from drip arm	Dilution effect could potentially result in insufficient red cells to perform the tests requested. A repeat sample would be requested resulting in possible transfusion delays.
Incorrect container or anticoagulant	Gel tube (brown) or transferring blood form one tube to another	Sample would clot and be unsuitable for analysis. A repeat sample would be requested resulting in possible transfusion delays.
Lipaemia	Specimen taken after a fatty meal	We are unable to process grossly lipaemic samples.

6. BLOOD TRANSFUSION

6.1. CONTACT NUMBERS and Opening Hours

The Transfusion department is open 24/7 please see page 2/3 for details on how to contact the department and requesting urgent sample.

Routine enquires can be made by contacting the department: Mon – Fri 09:00 – 17:00hrs

St Helens and Knowsley

Blood Transfusion Laboratory	0151 430 **1584**
Transfusion Coordinator	0151 290 **4214**
Consultant Haematologist Secretaries	0151 430 **1825**
Blood Transfusion Manager	0151 478 **7501**

Southport and Ormskirk

Blood Transfusion Laboratory	01704 70 **4176**
Blood Transfusion Manager	01704 70 **4035**
Consultant Haematologist Secretaries	01704 70 **4721**
Transfusion Practitioners/Coordinator	01704 70 **5175/4176 Bleep 3756 5355**

6.2. Out of Normal Working Hours

St Helens and Knowsley – Whiston (Open 24 Hours per day)
0151 430 1584

Please do not hesitate to call or visit the Transfusion Department for help or information.

Southport (Open 24 Hours per day)
01704 704176
Ormskirk (Open Mon – Friday: 08:30 – 17:00hrs; Weekend and Bank Holidays 09:00 – 14:00hrs)
Ormskirk Site – contact Southport Site numbers as stated above

ODGH site offers limited on-site testing including some Haematology and urgent Transfusion. All other work is transported on scheduled transport to SDGH or Whiston site to process.

6.3. Out of hours (OOHs)Transport of samples from Ormskirk to Southport/Whiston

When samples need to be sent to the laboratory out of hours from Ormskirk, please contact the porter on ext. 6153 or ascom 3751. The porters will collect and transport the samples on the appropriate transport method. Please also contact Blood Transfusion department at Southport to let them know you have an urgent request.

6.4. Transfusion Clinical Advice

For routine clinical advice please contact the department by as indicated in section 6.1 above.
FOR URGENT OUT-OF-HOURS CLINICAL ADVICE, PLEASE CONTACT SWITCHBOARD FOR THE ON-CALL HAEMATOLOGIST.

6.5. TRANSFUSION POLICY

6.5.1. St Helens and Knowsley

Trust Policies are available on the intranet. **Main policy: STHK1588 - Blood Transfusion Policy**.

STHK0839 - Consent for Blood component and Blood product Transfusion and management of patients refusing consent.

STHK1340 - The Transfusion Management of Major Haemorrhage

STHK1503 - Non-Medical Authorisation of Blood Component Transfusion (NABT)

6.5.2. Southport and Ormskirk

The Southport and Ormskirk Trust policy regarding transfusion; Clin Corp 39-Blood Transfusion Policy (Incorporating Adult Major haemorrhage Protocol) is available on the trust intranet site via the policy page and also on the Transfusion section of the Pathology website

Blood Transfusion consent is recorded on Blood Transfusion authorisation Sheet/prescription record in accordance with the above policies.

6.6. IMPORTANT FACTS FOR TRANSFUSIONS

Two facts cannot be stressed too strongly!

- An incompatible transfusion may be **fatal**, check **full** patient identity at all stages of the process.
- Blood for transfusion is a limited resource and wastage must be avoided if the service is to remain viable.

6.7. TRANSFUSION REQUESTS

6.7.1. Request forms

St Helens and Knowsley

Request forms must be completed with a minimum of 3 patient identifiers,

- Full name
- Date of Birth
- Hospital number or NHS number

In addition, location, consultant, clinical details, sex of patient, date and time of request, blood products

required, date and time required, and any other relevant information must be completed.

The signature of the authorised requestor and the person positively identifying the patient and taking the sample must also be given.

Remember that addressograph labels are **only acceptable** on transfusion request forms and must not be used to label the sample.

There may be on occasion a patient, a private patient for example, who does not have an NHS number or valid Hospital number. Such patients are probably oversees patients or Scottish patients whose NHS numbers are not in the correct format for the laboratory information system. Such cases should be discussed with the Transfusion laboratory who may approve use of the first line of address. It is important to discuss such cases with the laboratory prior to sample collection to avoid sample rejection.

Amendments to any core identifiers or key information (signatures, times, dates) will not be accepted.

Southport and Ormskirk

Request forms should be legibly labelled with

- Patient's surname and first name
- Date of birth
- Sex
- Unique identification number **(NHS number should be used whenever possible)**

This must also detail any blood product requirements and the location of the patient for transfusion. The form should also detail the patients address, blood group, clinical diagnosis, the reason for transfusion or indication code, details of the requestor, previous reactions to blood components, any known pregnancies and any known special requirements e.g. CMV-seronegative.

The signature of the authorised requestor and the person positively identifying the patient and taking the sample must also be given.

There may be on occasion a patient, a private patient for example, who does not have an NHS number or valid Hospital number. Such patients are probably overseas patients or Scottish patients whose NHS numbers are not in the correct format for the laboratory information system. Such cases should be discussed with the Transfusion laboratory who may approve use of the first line of address. It is important to discuss such cases with the laboratory prior to sample collection to avoid sample rejection.

6.7.2. Samples

St Helens and Knowsley

The sample for grouping/crossmatching must be taken and labelled by either the responsible Medical Officer, or an authorised phlebotomist/nurse/midwife.

Samples must be labelled with at least the same 3 identifiers present on the request form and the patient's location. The sample must also be dated and timed and signed by the collector. Sample labels must be **handwritten** or labelled using **SafeTx**.

TO AVOID DELAY, PLEASE CHECK THAT THE DETAILS ON THE SAMPLE AND THE REQUEST FORM ARE COMPLETE AND CORRECT BEFORE BRINGING THEM TO THE LABORATORY.

Southport and Ormskirk

The blood sample may be taken by a member of staff who has been trained and competency assessed to do so and must identify themselves on the request form.

The sample label must be **HANDWRITTEN** at the bedside by the person who took the s sample and must include:

- Patients surname and first name
- Date of birth
- Unique identification number (NHS number should be used whenever possible)

The sample must also be labelled with date and time of sampling and the identity of the person taking the sample.

All labelling must be legible and accurate, and all details must match those provided on the request form.

6.8. ROUTINE CROSSMATCHING

6.8.1. Routine Requests - St Helens and Knowsley and Southport and Ormskirk

A group and save less than 7 days old can be converted to a routine cross match providing the patient has not received any red blood cells or been pregnant in the preceding 3 months*. If patients have been pregnant or transfused within the last 3 months then the sample is valid for 72 hours. Routine crossmatches are usually available the same working day. However, a routine crossmatch can be provided in 45-60 minutes if clinical need indicates. However, a day's notice should normally be given. Additional units can be added to a crossmatch within 72 hours from sample being taken or 72 hours from first unit being transfused. Any additional units after this time period will require a fresh sample.

*A deviation from the 3 day rule can be applied for pregnant women with no clinically significant antibodies, who for example, require blood to be on standby for potential obstetric emergencies.

6.8.2. Manual Crossmatch

Blood can be manually crossmatched for patients, this process takes around 60 minutes in addition to the time taken to group and antibody screen the sample on the analyser. Manual Crossmatching is performed when the 'Electronic Issue' rules, explained below are not met.

6.8.3. Electronic Issue

Electronic crossmatch/issue is safer for the patient and can greatly reduce the time taken for blood to be available for patients providing that the following criteria has been met:

- The laboratory has received and processed a group and screen on at least 2 separate occasions
- Blood grouping and antibody screening was fully automated with no manual intervention

- Current blood group and historical blood group must match
- The patient has never has no clinically significantly antibodies
- The patient has not has a bone marrow/haemopoetic stem cell transplant
- The current sample complies with the timings described above

If patients are not suitable for electronic issue then blood will be manually crossmatched, how long this takes depends on availability of specially selected products.

To determine if a patient is suitable for electronic issue and whether a confirmatory sample is required:
For Whiston and St Helens check ward enquiry first, otherwise contact the laboratory on 0151 430 1584 (Whiston).
For S&O contact laboratory 01704 704 176 (Southport).

6.8.4. Surgical Requests (Fast Issue)

Blood can be provided at short notice for patients provided that **TWO** separate samples for blood group are recorded in the laboratory, there is a retained sample less than 7 days old (or 3 days if pregnant or transfused within last 3 months) at the time the blood is required and the patient has no irregular antibodies on record. Cross matched samples will be kept for 5 days post crossmatch. To confirm patient suitability for fast issue contact Blood Transfusion on ext. 1584. Patients with antibodies will not be suitable for 'Fast Issue'. Individual cases should be discussed with the transfusion laboratory who will advise on how long it will take to provide compatible blood. The main transfusion policy explains which surgeries require blood to be put on standby prior to theatre for patients with antibodies. Further advise is always available from the transfusion laboratory and haematologist on-call.

6.9. EMERGENCY CROSSMATCHING

6.9.1. St Helens and Knowsley

In an emergency, please contact the Transfusion department on ext. 1584. The sample should be brought DIRECTLY TO THE BLOODTRANSFUSION LABORATORY. It should NOT be left at reception. SAMPLES MUST BE HANDED TO A MEMBER OF STAFF.

6.9.2. Southport and Ormskirk

If blood is required within 2 hours then the laboratory must be contacted on ext. 4176.

Inform the laboratory how quickly the blood is needed, an exact timescale must be communicated and avoidance of terminology such as 'ASAP'.

6.9.3. Emergency blood product turnaround time

Table 2.25 below explains how quickly urgent blood can be provided in emergency situations.

6.10. Emergency O Negative Blood

6.10.1. St Helens and Knowsley

There are two units of uncrossmatched, confirmed and labelled O RhD NEGATIVE available for **EMERGENCY USE ONLY** in the blood refrigerators in:

- A & E Resus Dept.
- Delivery Suite (One unit of ORhd Negative for paediatric use only is also available)
- St Helens Hospital – theatre recovery not at Elyn Lodge
- 4A

IT IS IMPERATIVE TO CHECK THE LABELS ON THESE UNITS CAREFULLY BEFORE TRANSFUSION SINCE THE REFRIGERATORS ALSO HOLD CROSSMATCHED BLOOD OF DIFFERENT GROUPS.

The Transfusion Laboratory **MUST** be informed as soon as these units have been removed from the refrigerator so that they can be replaced. Traceability should be retuned as soon as possible.
Please take a sample from the patient before transfusing O neg, this is for retrospective crossmatch and will allow for testing before any further units are required.

Additional Emergency O negative and O Positive blood is also available via the transfusion laboratory.

6.10.2. Southport and Ormskirk

There are at least 2 units of uncrossmatched Emergency O Rh(D) neg blood available in:

- Specimen reception blood bank SDGH
- Specimen reception blood bank ODGH
- Maternity blood fridge ODGH

These may be removed on authorisation of medical staff tending the emergency for immediate transfusion. The laboratory must be informed immediately if this is removed, and the blood must be signed out in the blood bank register. The associated two part form must be completed, one part placed in the case notes and one part returned to the laboratory as indicated on the form, the tag from the blood must be completed and also returned to the laboratory on completion of the transfusion episode.

Please take a sample from the patient before transfusing O neg, this is for retrospective crossmatch and will allow for testing before any further units are required.

6.11. CONSERVATION OF BLOOD

6.11.1. Group and Save

Ordering blood as a precautionary measure results in wastage and reduces available stocks. A procedure which minimises wastage and delay if blood is required is the request 'GROUP AND SAVE'. The patient's blood group is determined and the sample screened for irregular antibodies. The plasma is retained so that blood can be crossmatched immediately if the need for blood arises.

6.11.2. Unused blood

St Helens and Knowsley

Blood not used within 24 hours of the time and date required will normally be returned to stock unless the Laboratory is notified.

Southport and Ormskirk

Blood is usually reserved for 30 hours (until end of next working day).

6.12. COLLECTION OF CROSSMATCHED BLOOD

6.12.1. Location of Crossmatched Bloods

St Helens and Knowsley

Crossmatched blood may be collected at any time from the designated Blood Bank refrigerator in the Blood Issue Room or satellite refrigerators (A&E, Delivery Suite, 4A, St Helens Theatre recovery Lodge, Ward 2A and the Lilac Centre).

Southport and Ormskirk

The issue fridges are located in the foyers of SDGH and ODGH blood science laboratories. There are also satellite fridges in ODGH maternity and SDGH theatre, units may be transferred here to cover procedures but should be returned to the main issue fridge as soon as the patient has been moved back to the ward.

6.12.2. Collection

St Helens and Knowsley

Please bring a blood collection pick- up slip/ blood collection card from the ward to confirm the patient identification details against those on the blood bag label. When details are confirmed the collector must complete the issue book and sign, date and time the collection. Any products collected from the laboratory must be taken back to ward/destination in a transport box.
Multiple units of blood signed out must be stored in the designated satellite blood refrigerators and unused units returned to the Laboratory Blood Bank refrigerator as soon as possible.

The transfusion **MUST** be started within 30 minutes of removing the blood from the refrigerator.

Southport and Ormskirk

All staff collecting blood products for transfusion must have been competency assessed to do so within 2 years in accordance with NPSA guidelines.

Blood components should be signed out using printed patient information, preferably prescription chart, containing patient's surname, first name, date of birth and unique identification number. The details on the documentation must be checked against the patient details on the traceability tag.

All blood products collected from the laboratory must be signed out in the blood bank register (with the exception of blood being moved to theatre to provide cover for a theatre list where there is a separate procedure) see Clin Corp 39. The date & time blood/ blood component was removed from the blood bank is recorded on the Transfusion Authorisation Record (TAR) which MUST be brought to transfusion when collecting any products.

6.13. RETURN OF UNUSED BLOOD

The fate of each unit of blood must be recorded. All blood that is no longer required **MUST** be returned to the Laboratory Blood Bank Refrigerator.

6.13.1. Within 30 Minutes of Removal

If blood is not required and it has been out of the refrigerator for less than 30 minutes it may be re-issued. **The Details and time that the unit was returned must be entered into the Blood Bank register.**

6.13.2. More Than 30 Minutes After Removal

St Helens and Knowsley

Blood returned to the Laboratory after 30 minutes is **NOT SAFE** for reissue and must be brought to the attention of transfusion staff.

Southport and Ormskirk

The unit must be signed back into the register with the time returned and must be handed to laboratory staff NOT placed in blood bank.

STAFF MUST BE NOTIFIED IMMEDIATELY.

6.14. ADMINISTRATION OF BLOOD TO A PATIENT INCLUDING SPECIAL REQUIREMENTS

St Helens and Knowsley

Please refer to the SOP 'Policy on the Administration of Blood and Components' for full details of identification, administration, and observations required for safe transfusion to the patient and for the 'Use of CMV and/or irradiated blood and platelets for haematology patients'.

Southport and Ormskirk

Please refer to Clin Corp 39 - Blood Transfusion Policy (Incorporating Adult & Paediatric Major haemorrhage Protocol)

6.15. TRANSFUSION REACTIONS

St Helens and Knowsley

For the procedure for what to do in the event of a transfusion reaction please refer to the 'Policy on the Administration of Blood and Components' that includes the ***management and reporting of transfusion reactions –*** outline below.

Southport and Ormskirk

Please refer to Clin Corp 39 – Blood Transfusion Policy (Appendix -Management of severe acute reaction)

6.15.1. Procedure

St Helens and Knowsley

If a member of staff suspects a significant transfusion reaction, either immediate or delayed, then a medical officer must be called and the transfusion will be stopped if indicated.

Southport and Ormskirk

If there appears to be a severe transfusion reaction, clamp off the infusion immediately and get help. Call for urgent medical attendance and patient assessment, keep the IV line open with 0.9% sodium chloride, record the vital signs including blood pressure, and also inform the laboratory.

The blood bag and attached giving set should be returned to the Transfusion Department, this must be made secure to avoid leakage, together with required samples indicated on the investigation form. The Transfusion Reaction Investigation form will be issued by the laboratory and **MUST** be completed in full.

The ward investigation form for transfusion reaction can be found in Appendix of Clin Corp 39 – Blood Transfusion Policy and can also be obtained from the transfusion laboratory.

Whilst laboratory investigations are being carried out any other units of blood that have been issued to the patient will be recalled.

6.15.2. Notification

St Helens and Knowsley

All transfusion incidents, including near misses, (e.g. patient not fully identified, wrongly labelled sample) should be notified as a Trust Incident Report, (via Datix)

In addition, they should be reported to Serious Hazards of Transfusion (SHOT) via the Transfusion Co-ordinator or other Transfusion staff. This is a national scheme designed to share and learn from errors to prevent them recurring.

For more information about SHOT, please contact the Transfusion Co-ordinator or Blood Bank Manager.

Southport and Ormskirk

All transfusion incidents, including near misses, (e.g. patient not fully identified, wrongly labelled sample) should be notified as a Trust Incident Report, via Datix.

In addition they should be reported to Serious Hazards of Transfusion (SHOT) via the Transfusion Co-ordinator or other Transfusion staff. This is a national scheme designed to share and learn from errors to prevent them recurring.

For more information about SHOT, please contact the Transfusion Co-ordinator or Blood Bank Manager.

6.16. PLASMA PRODUCTS

6.16.1. St Helens and Knowsley

The following plasma products are held in stock and available on receipt of a fully completed request form:

5% Human Albumin Solution (H.A.S)	500 ml
Small stocks of H.A.S. are held in AED	
20% 'Salt-poor' Albumin	100 ml
Anti Rh immunoglobulin	1500 I.U.

Record of Administration
Since these products are human-derived, it is essential that a record be kept by the departments of

- Patient's name/DOB and hospital number/address
- Product batch number
- Date transfused

THIS IS A REQUIREMENT OF PRODUCT LIABILITY UNDER THE CONSUMER PROTECTION ACT (1987)

6.16.2. Southport and Ormskirk

The following plasma products are held in stock and available on receipt of a fully completed request form:

5% Human Albumin Solution (H.A.S.)	500 ml
20% 'Salt-poor' Albumin	100 ml
There is also one bottle of 4.5% on the Resus trolley of Paediatric A+E	
Anti Rh(D) immunoglobulin	1500 I.U.

Record of Administration

These products are derived from blood and administration must follow the same protocols as for cellular components:

- They must be collected from the blood bank by competent staff
- They must be signed out fully in the blood bank register
- The products must be prescribed, and administration must be fully documented on the prescription (including batch number and expiry date)
- The traceability tag must be completed and returned to the laboratory

6.17. FROZEN PLASMA

6.17.1. St Helens and Knowsley

Fresh Frozen Plasma (FFP) } Must be ABO compatible
Cryoprecipitate (CRYO) }

These products take about 30 minutes to thaw in the laboratory prior to issue, and must be transfused within 4 hours of thawing. A fully completed handwritten request form is required. Record must be made as for HAS.

6.17.2. Southport and Ormskirk

Unless as part of a major haemorrhage activation these products require consultant haematologist approval prior to requesting.

Fresh Frozen Plasma (FFP) } Must be ABO compatible
Cryoprecipitate (CRYO) }

These products are stored frozen, thawing takes between 15 and 30 minutes. Once thawed they have a shelf life of 24 hours if kept in the blood fridge; if kept at room temp then transfusion must be completed within 4 hours of thawing. Administration of this component should be documented as per all blood components.

6.18. PLATELET CONCENTRATES

6.18.1. St Helens and Knowsley

Platelets are not held in stock. They are ordered by the laboratory on a named patient basis from the NBS on receipt of a fully completed handwritten request form, including the reason for the request. They must be ABO and Rh D compatible, therefore the patient's blood group will need to be determined if there is no previous record in the department.

The platelets will be delivered to the Transfusion Laboratory and the ward will be notified upon arrival. Platelets should be collected immediately prior to use as they need to be continually mixed on agitator in the laboratory before transfusion.

6.18.2. Southport and Ormskirk

Unless as part of a major haemorrhage activation these products require consultant haematologist approval prior to requesting. Administration of this component should be documented as per all blood components.

6.19. Prothrombin Complex Concentrate (or Beriplex- Southport and Ormskirk)

6.19.1. St Helens and Knowsley

Indicated for use to rapidly reverse the effects of warfarin/DOACCS, or warfarin/DOAC overdose during major bleeds and intracerebral haemorrhage or prior to emergency procedures. Requires consultant haematologist approval prior to requesting.
Two emergency adult doses (3000IU) are available for use in AED.

6.19.2. Southport and Ormskirk

Beriplex is presented as freeze dried vials of powder containing approximately 250, 500 or 1000 international units of factor IX per vial.

The dose is calculated by laboratory staff using patient's weight and current INR (the sample should have been taken within 4 hours of request).

Administration of this component should be documented as per all blood components.

6.20. SAMPLE REQUIREMENTS

6.20.1. St Helens and Knowsley and Southport and Ormskirk

Blood Group Antibody Screen Antibody Identification Cross Match Transfusion reaction HLA/DR Typing	7.5 ml EDTA (Red) Blood Transfusion Tube Children <4 months Blue 1.6ml EDTA
Direct Coombs Test	3 ml EDTA bottle (Red)
Kleihauer	3 ml EDTA bottle (Red)
Cold Agglutinins	7.5 ml EDTA (Blue) Blood Transfusion Tube
Cord samples	7.5 ml EDTA (Blue) Blood Transfusion Tube Must be labelled with Babies details to comply with BSH guidelines (British Society for Haematology). If forename is not known use "Baby". Sample must be labelled with Name of baby, DOB, NHS number and address of the baby.

6.20.2. Southport and Ormskirk

Blood Group Antibody Screen, Antibody Identification Cross Match, Transfusion reaction, HLA/DR Typing	7.5 ml EDTA (Blue) Blood Transfusion Tube Children <4 months Blue 1.6ml EDTA
Direct Coombs Test	3 ml EDTA bottle (Red)
Kleihauer	3 ml EDTA bottle (Red)
Cold Agglutinins	7.5ml EDTA (Blue) Transfusion tube

6.21. TRANSFUSION RECORDS

In order to comply with the EU Blood Directive, there must be a complete audit trail from blood donor to recipient which must be retained for 30 years.

6.21.1. St Helens and Knowsley

A blood transfusion record sheet must be completed by clinical staff for EVERY unit transfused. One sheet can be used for a maximum of 3 units, or each transfusion episode if less than 3 units. The top copy **MUST** be returned to the Transfusion Laboratory without delay, and the bottom copy is to be filed in the patient's notes. The Trust is subject to inspection for compliance.

6.21.2. Southport and Ormskirk

All units:

- Must be signed out fully in the blood bank register
- Must be prescribed and administration must be fully documented on the prescription (including unit/pack number and expiry date)
- Transfusion Nursing Care plan – 43 must be completed with the pack numbers and requires transfusion observations.
- Ward staff now must complete and return the top copy of the Transfusion Authorisation Record (TAR) following transfusion.

6.22. TRAINING IN TRANSFUSION

To comply with Clinical Governance and improve patient safety, all staff involved in the process must receive training in safe transfusion practice according to their grade and role.

6.22.1. St Helens and Knowsley

Awareness sessions are provided at Trust induction of clinical staff and training provided at IV Drug Administration Sessions, in addition to yearly Clinical Mandatory Training, Ad hoc sessions are provided as required. Porters receive training in collection of blood and blood components as part of their local induction programme.

Training is carried out by the Transfusion Co-ordinator or deputy. Please contact the Transfusion Co-ordinator for more information about training available.

Competency Assessment for any grade of staff taking part in the Transfusion process is 3 yearly and is accessed through ward-based assessors. There are three competencies attached to the transfusion process, venepuncture, and collection of blood from fridge and administration of blood.

6.22.2. Southport and Ormskirk

All staff who are involved in the transfusion process should attend annual transfusion updates; there are also specialist sessions for paediatric and maternity staff. Transfusion training is provided for medical staff at induction and annual updates. Ad hoc sessions are provided as required.

Training is carried out by the Transfusion Practitioners.

Competency assessments for collection and administration of blood products are 2 yearly and accessed through ward based assessors.

6.23. Transfusion TAT

Transfusion Turnaround times (TAT)

Test	Urgent	Routine
Emergency provision of Group O blood (no current group and screen sample)	10 minutes	N/A
Emergency provision of blood (if previously grouped and antibody screen negative and sample < 72 hours old)	10 minutes	N/A
Provision of blood (if NOT previously grouped and antibody screened)	90 minutes (provided no antibodies detected)[1]	N/A
Provision of fully crossmatched Blood (if previously grouped and antibody screen is positive or known antibodies)	Variable, contact department for advice[2]	N/A
Provision of blood products: FFP Cryoprecipitate Platelets PCC Albumin Anti-D	 60 minutes 60 minutes Contact department 10 minutes 30 minutes 30 minutes	N/A – pre ordered products will be available for the requested time
Cord group for Rh Negative mothers and mothers with antibodies	N/A	2.5 days
Kleihauer film*	2 hours	2.5 days
Blood group and antibody screen	2 hours	2 days

*Urgent requests must be discussed with consultant haematologists

[1]If antibodies are present the provision of compatible blood cannot be guaranteed

[2]When antibodies are known to be present Blood Transfusion must be contacted as soon as possible; non urgent treatment should be delayed until blood is available

6.24. Transfusion Referral Laboratories

Test Required	Request Form Number	Sample requirement	TAT	Contact Details	License & Accreditation Details
Red Cell Immunohaematology; Antibody identification, blood grouping issues, complex crossmatches	Request for Reference Serology, **Form 1A** - Red Cell Immunohaematology	**Specimen Type – EDTA**	**95% referrals reported within 5 working days – reported to us**	**RED CELL IMMUNOHAEMATOLOGY** **NHS Blood and Transplant - Liverpool** 14 Estuary Banks, The Estuary Commerce Park Speke, Liverpool L24 8RB. RCI Laboratory - 0151 268 7148, Fax – 0151 268 7152 Hospital Service department - 0151 2687170 (for out-of-hours requests)	ISO15189 UKAS Accreditation UKAS: 8740 MHRA (MIAIMP)* : BE25224 site : 119781
Histocompatibility and Immunogenetics; Platelet refractoriness, HLA/HPA/HNA antibody screening & typing etc	Histocompatibility and Immunogenetics, **Form 3A** – Diagnostics Laboratory	**Specimen Type – EDTA**	**TAT see table below**	**HISTOCOMPATIBILITY & IMMUNOGENETICS** **NHS Blood and Transplant – Sheffield** Longely Lane Sheffield S5 7JN. Laboratory - 0114 358 4839 Fax - 0114 358 4850 Out-of-hours - 0114 358 4817 /4832	ISO15189 UKAS Accreditation UKAS: 8740 MHRA (MIAIMP)* : BE25224 site : 89067
Histocompatibility and Immunogenetics; Investigation of fetal/neonatal alloimmune thrombocytopenia, heparin induced thrombocytopenia etc	Histocompatibility and Immunogenetics, **Form 3D** – Platelet Immunology	**Specimen Type – EDTA**	**TAT see table below**	**HISTOCOMPATIBILITY & IMMUNOGENETICS** **NHS Blood and Transplant - Filton** 500 North Bristol Park Northway Filton Bristol	ISO15189 UKAS Accreditation UKAS: 8740

				BS34 7QH. Laboratory - 0117 921 7372 Fax - 0117 912 5731 **Post sample direct to NHSBT Bristol to avoid delays in analysis**	MHRA (MIAIMP)* : BE25224 site : 616467
HLA Typing/antibody screening for Stem Cell Transplant patients	Liverpool Clinical Laboratories (LCL) Department of Histocompatibility and Immunogenetics	**Specimen Type – EDTA**	TAT 90% within 14 days	Immunology Department Duncan Building Royal Liverpool Hospital Daulby Street Liverpool L7 8XP Immunology: 0151 706 4410	ISO15189 UKAS Accreditation: 9779

Service	Report	95% within
Immunological refractoriness to platelets	HLA type	7 working days
	HLA specific antibody screen	7 working days
Platelet Immunology (PI)	Platelet antibody specificity (e.g. NAIT) **	5 working days
	HIT	5 working days
	HIT - urgent result *	1 working day
	Other drug induced thrombocytopenia	20 working days
	Foetal HPA typing	3 working days
Granulocyte Immunology (GI)	All tests	21 working days
Haematopoietic Stem Cell Transplantation (HSCT)	HLA type - class I and II	7 working days
Solid Organ Transplantation	HLA type - class I and II	7 working days
	HLA specific antibody screen	15 working days
	Urgent result	1 day
Immunogenetics	All tests	7 working days

7. MICROBIOLOGY

7.1. CONTACT NUMBERS (Including Clinical Advice)

7.1.1. During Normal Working Hours

The Microbiology department is open 24/7 please see page 2 and 3 for details, **please notify the department of urgent samples.**

Routine enquires can be made by contacting the department Mon – Fri 09:00 – 17:00hrs

Microbiology Department	Laboratory	**0151 430 1837** **0151 430 1652** (out of hours)
Consultant Microbiologist	Secretaries (Whiston) Secretaries (S&O)	0151 430 **1831** 01704 704717
Andrology Appointment	Secretary (Whiston)	0151 430 1831

7.1.2. Out of Normal Working Hours

The laboratory should be notified of all urgent requests/ precious samples e.g. CSF's samples; please see details on pages 2 and 3.

We try to process all samples promptly on a 24/7 basis, to avoid delays created by Urgent samples entering the normal flow of routine samples please notify when sending or if expected results are not available.

7.1.3. Out of hours (OOHs) Transport of samples from Ormskirk to Southport/Whiston

When samples need to be sent to the laboratory out of hours from Ormskirk, please contact the porter on ext. 6153 or ascom 3751. The porters will collect, and transport the samples on the appropriate transport method.

For any urgent Microbiology requests please contact Microbiology department at Whiston.

7.1.4. Microbiology Clinical Advice

Please contact Microbiology on 1837/ 1652 (out of hours) or from Southport speed dial # 6406

For urgent medical advice contact the Microbiologist on call via Whiston Hospital Switchboard 0151 426 1600 or Southport Hospital Switchboard 01704 547471

7.2. ABOUT MICROBIOLOGY

We provide a comprehensive range of diagnostic services including:

- General Microbiology
- Parasitology
- Mycology
- Virology / Serology
- Andrology
- Molecular testing
- Antibiotic Assays (Gentamicin/Vancomycin performed by Biochemistry)
- Immunology referred tests (Aspergillus precipitins, specific antibodies and TB quantiferon)

We participate in national quality control schemes for all of the above services with consistently high performance. We provide training for junior medical staff, biomedical scientists and medical students. We are also actively involved with research and development. Both laboratory and clinically based audit projects are regularly undertaken.

7.3. ANTIBIOTIC PRESCRIBING

If further information is required please contact the medical microbiologist for advice ext. 1837 or 0151 430 1837.

To view St Helens and Whiston Antibiotic Policy (click here) or can be found on the intranet site.
To View S&O Antibiotic Policy please check S&O site Intranet.

7.4. INFECTION PREVENTION AND CONTROL ADVICE

7.4.1. St Helens and Knowsley

See the Infection Control Manual located on the intranet. If further information is required contact:

Infection Prevention Team	0151 430 2452**/1384/1077** or bleep 7570
Out of hours	On-call microbiologist via switchboard

During normal working hours - first point of contact should be the Infection Prevention Team - ext 2452/1384/1077 or bleep 7570). Out of hours - contact on call microbiologist via switch board

7.4.2. Southport and Ormskirk

The Infection Prevention Team can be contacted on **01704 704169** during office hours or via switchboard at other times.

Consultant Microbiologist	
Secretary	01704 704717
Out of hours	Radio-pager via switchboard

7.5. DIAGNOSTIC MICROBIOLOGY

To inform the laboratory about specimens requiring urgent processing:

- During Normal working day contact the laboratory on 0151 430 1837
- Out of hours, contact the Biomedical Scientist on 0151 430 1652.

Contact the Medical Microbiologist for advice 0151 4301837 or switchboard out of hours.

7.6. MICROBIOLOGY SPECIMENS

See relevant sections below.

Always obtain appropriate specimens e.g. blood, faeces, urine, swabs, pus before starting the patient

on antibiotics. Send specimens promptly to ensure that all routine specimens are received in the laboratory before 4.00 pm.

7.7. ANTIBIOTIC ASSAYS

Gentamicin and vancomycin assays are analysed by the Biochemistry Department.

Other aminoglycosides e.g. amikacin, streptomycin, tobramycin, netilmicin, teicoplanin are reserved antibiotics and should **only** be used after consulting the Microbiologist. These assays are referred to other laboratories (e.g. Bristol Antimicrobial Reference Laboratory) with the exception of Teicoplanin which is analysed in microbiology.

Wherever possible antibiotic assays should be performed during normal laboratory hours. On call assays should only be requested in exceptional circumstances

Refer to the Trust Antibiotic Policy on the intranet.
To view St Helens & Whiston Antibiotic Policy (click here) or can be found on the intranet site.
To View S&O Antibiotic Policy please check S&O site Intranet.

7.8. BLOOD CULTURES

Please note that avoiding blood culture contamination reduces laboratory work and hospitalisation costs.

When taking other blood specimens e.g. FBC, U &Es etc. always inoculate the blood cultures first to prevent contamination. Send blood cultures in a plastic bag, with one request form for each set, to the laboratory as soon as possible. All blood culture samples should be delivered to Pathology Reception.

All Blood Culture samples should be delivered to Pathology Reception ASAP.

Adequate clinical information must be written on the request form e.g. suspected clinical conditions like meningitis, osteomyelitis, arthritis, pneumonia and always give travel history if any. There is no value in collecting more than 3 sets of blood cultures. One or two sets are sufficient for most infections apart from infective endocarditis.

If infective endocarditis or endovascular infection is suspected, take **three sets** of blood cultures at separate times to demonstrate persistent bacteraemia as a result of an endovascular focus of infection: 1 hour intervals are a minimum; ideally take samples at 6 hours apart **unless the patient is acutely unwell or haemodynamically unstable in which case, in order to avoid delaying antibiotics, take the blood cultures at 15 minute intervals then start antibiotics.**
Significant positive blood culture results will be communicated by telephone to the clinical team by a medical microbiologist. Negative blood culture results: an interim report is sent out after 48 hours incubation, final report at 5 days. For neonates, interim report is sent out at 36 hours if negative.

Take blood cultures using aseptic non-touch technique (ANTT).
Please use blood culture packs provided by the laboratory.

Clean skin: See Blood Culture sampling leaflet included in blood culture pack.

Complete FREPP sticker with details of who took the blood culture, whether ANTT was adhered to and site where sample was taken and attach to request form.

- Aerobic bottle: Add 3-10 ml blood (optimum 8-10 ml)
- Anaerobic bottle: Add 3-10 ml blood (optimum 8-10 ml)
- Paediatric bottle: Add 1-3 ml blood

7.9. ASCITIC FLUID

Collect specimen into a sterile universal container and transport immediately to the laboratory.

7.10. JOINT FLUID

Collect specimen into a sterile universal container and transport immediately to the laboratory. The clinical details should indicate any history of intra-articular steroids.

7.10.1. Prosthetic Joint Fluid

Please send plain universal pot and Orange top Lithium Heparin sample for cell count to lab without delay.

7.11. A.S.O.T (ANTISTREPTOLYSIN O TITRE)

- 5 ml clotted blood (plain tube)
- 1ml paediatric samples will be processed

Normal range <200 IU/ml

7.12. Sexually Transmitted Infections/ Neisseria nucleic acid amplification test (NAAT)

This is a very sensitive molecular test; please avoid any contamination when taking these samples.

- Use Aptima transport medium for sending first void urine,
- Use Aptima transport for urethral swab, cervical swab or eye swab
- Do not use bacterial culture swabs.

7.13. CSF

DO NOT USE THE PNEUMATIC TUBE must be hand delivered!

Please use CSF collection packs provided by the laboratory.

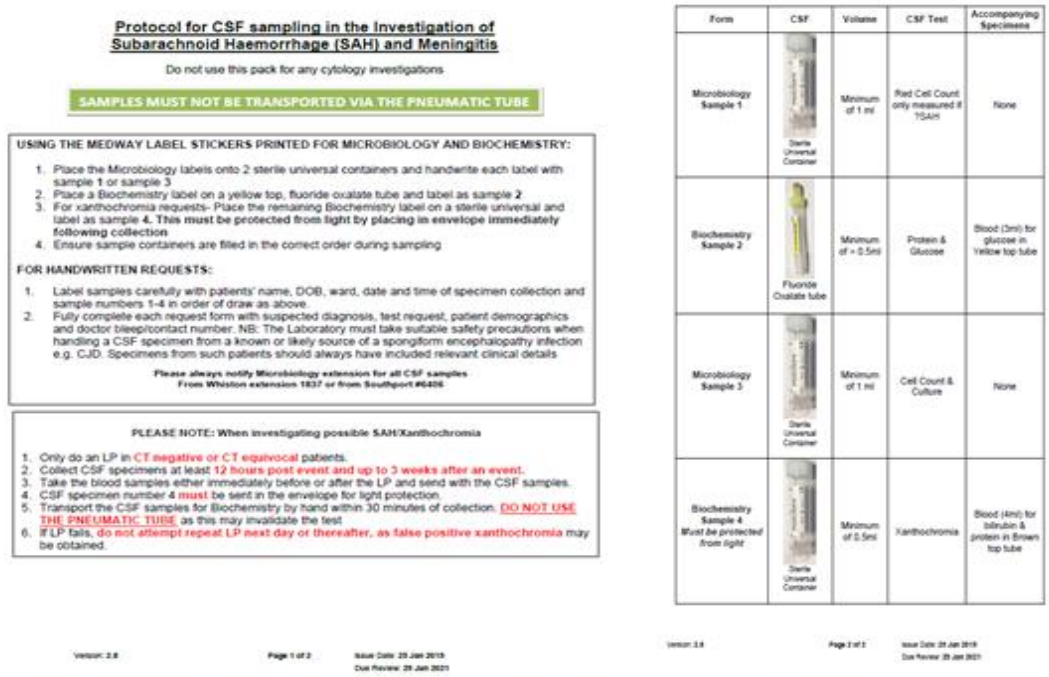
Please always notify microbiology on extension 1837/ 1652 (out of hours) for all CSF samples during normal working hours or via switch board out of hours.

Please always notify Microbiology Consultants (via switchboard) of any suspected spongiform encephalopathy infection e.g., Creutzfeldt-Jakob disease (CJD).

Protocol for CSF sampling in the investigation of Subarachnoid Haemorrhage (SAH) and Meningitis.

1. Please label samples carefully with order number (1-4), patients' name, DOB, ward, date and time of specimen collection.
2. Unlabelled specimens will not be accepted.
3. Fully complete each **request form** with suspected diagnosis, test request, patient demographics and doctor bleep/contact number. NB: The Laboratory must take suitable safety precautions when handling a CSF specimen from a known or likely source of a spongiform encephalopathy infection e.g. **CJD. Specimens from such patients should always have included relevant clinical details.**
4. CSF specimen number 4 must be sent in the envelope for light protection.
5. **Do not** use this pack for any cytology investigations.

Example of CSF collection pack:



Protocol for CSF sampling in the Investigation of Subarachnoid Haemorrhage (SAH) and Meningitis

Do not use this pack for any cytology investigations

SAMPLES MUST NOT BE TRANSPORTED VIA THE PNEUMATIC TUBE

USING THE MEDWAY LABEL STICKERS PRINTED FOR MICROBIOLOGY AND BIOCHEMISTRY:

1. Place the Microbiology labels onto 2 sterile universal containers and handwrite each label with sample 1 or sample 3
2. Place a Biochemistry label on a yellow top, fluoride oxalate tube and label as sample 2
3. For xanthochromia requests- Place the remaining Biochemistry label on a sterile universal and label as sample 4. This must be protected from light by placing in envelope immediately following collection
4. Ensure sample containers are filled in the correct order during sampling

FOR HANDWRITTEN REQUESTS:

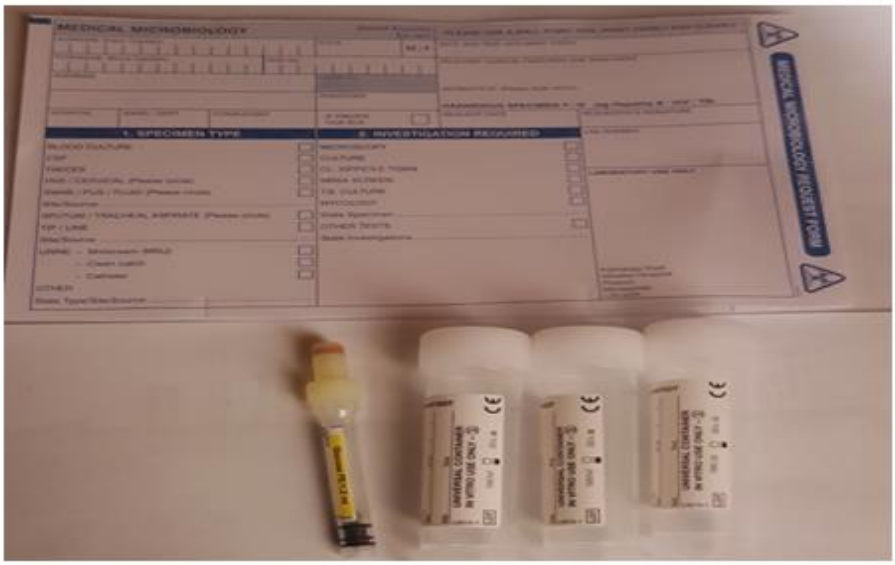
1. Label samples carefully with patients' name, DOB, ward, date and time of specimen collection and sample numbers 1-4 in order of draw as above
2. Fully complete each request form with suspected diagnosis, test request, patient demographics and doctor bleep/contact number. NB: The Laboratory must take suitable safety precautions when handling a CSF specimen from a known or likely source of a spongiform encephalopathy infection e.g. CJD. Specimens from such patients should always have included relevant clinical details

Please always notify Microbiology extension for all CSF samples
From Whiston extension 1837 or from Southport #6406

PLEASE NOTE: When investigating possible SAH/Xanthochromia

1. Only do an LP in CT negative or CT equivocal patients.
2. Collect CSF specimens at least 12 hours post event and up to 3 weeks after an event.
3. Take the blood samples either immediately before or after the LP and send with the CSF samples.
4. CSF specimen number 4 must be sent in the envelope for light protection.
5. Transport the CSF samples for Biochemistry by hand within 30 minutes of collection. DO NOT USE THE PNEUMATIC TUBE as this may invalidate the test
6. If LP fails, do not attempt repeat LP next day or thereafter, as false positive xanthochromia may be obtained.

Form	CSF	Volume	CSF Test	Accompanying Specimens
Microbiology Sample 1	Sterile Universal Container	Minimum of 1 ml	Red Cell Count only measured if SAH	None
Biochemistry Sample 2	Fluoride Oxalate tube	Minimum of > 0.5ml	Protein & Glucose	Blood (3ml) for glucose in Yellow top tube
Microbiology Sample 3	Sterile Universal Container	Minimum of 1 ml	Cell Count & Culture	None
Biochemistry Sample 4 Must be protected from light	Sterile Universal Container	Minimum of 0.5ml	Xanthochromia	Blood (4ml) for bilirubin & protein in Brown top tube



Please refer to section 5.17 for CSF Haematology tests.

Diagnosis ?	CSF	Volume	Container	Form	CSF Test	Accompanying Specimens
Meningitis or SAH	Specimen 1	Minimum of 1 ml	Sterile Universal Container	Microbiology	Red Cell Count only measured if ?SAH	***None***
Meningitis or SAH	Specimen 2	Minimum of 0.5ml	Yellow Top Tube	Biochemistry	Protein & Glucose	***Blood (3ml) for glucose in Yellow top tube***
Meningitis or SAH	Specimen 3	Minimum of 1 ml	Sterile Universal Container	Microbiology	Cell Count & Culture	***None***
SAH	Specimen 4	Minimum of 0.5ml	Sterile Universal Container	Biochemistry	Xanthochromia	Blood (4ml) for bilirubin and protein in Brown top tube. **MUST BE PROTECTED FROM LIGHT.**
TB meningitis	Specimen 5	Collect as much CSF as possible, ideally > 6 mls in adults	Sterile Universal Container	Microbiology	TB microscopy and culture	***None***

PLEASE NOTE – When investigating possible SAH/Xanthochromia:

1. Only do an LP in CT Negative or CT equivocal patients.
2. Collect CSF samples aseptically at least 12 hours post event and up to 3 weeks after an event.
3. Take the blood samples either immediately before or after the LP and send with the CSF samples.
   SAMPLES MUST BE PROTECTED FROM LIGHT.
4. Transport the CSF samples for Biochemistry by hand within 30 minutes of collection. **DO NOT USE THE PNEUMATIC TUBE** as this may invalidate the test.
5. If LP fails, do not attempt repeat LP next day or thereafter, as false xanthochromia may be obtained.

7.14. FAECES

Faecal samples are screened by PCR (Polymerase chain reaction) for the detection of enteric pathogens, Salmonella, Shigella, Campylobacter, verotoxigenic E.coli, Cryptosporidia, Giardia and C. difficile.

Test Available on Faeces	Sample Container
Bacteriology	Blue or Brown topped plastic container. Use scoop attached to lid to obtain a sample of the specimen. Do not fill container more than half full.
Virology	
Ova, cysts and parasites,	
C difficile testing - NB: Formed stool specimens are not tested for C difficile. If a patient has diarrhoea (Bristol Stool Chart types 5-7) that is not clearly attributable to an underlying condition (e.g. inflammatory colitis, overflow) or therapy (e.g. laxatives, enteral feeding) then send stool for C difficile testing as soon as possible. These selection criteria are as per the Department of Health Updated Guidance on the Diagnosis and Reporting of Clostridium Difficile 2012 **Click** here**.**	
H. pylori antigen testing	

Notify of any Foreign Travel etc on request form.

7.14.1. How to collect and store faeces samples – guidance for patients

Please click here link to NHS choice.

7.15. GENITAL TRACT SWABS

For detection of Neisseria gonorrhoea by culture:

- Male patient — Urethral swab (pharyngeal and anal swabs if indicated)
- Female patient — Cervical swab (pharyngeal and anal swabs if indicated)

For detection of Chlamydia/ Neisseria gonorrhoea/ Trichomonas vaginalis/ Mycoplasma genitalium/ HSV by Nucleic Acid Amplification Testing (NAAT):

- Use Aptima collection kits for either genital swabs or first void urine

For detection of

- Candida: HVS (ordinary swab)
- Bacterial vaginosis: HVS (ordinary swab)

Information for patient for self-collection of genital swabs are contained in each collection pack.

Intrauterine contraceptive device (IUCD): do not send to laboratory unless examination is strongly suggestive of Pelvic inflammatory disease (PID) or infection with Actinomyces is suspected. IUCD samples are not routinely cultured.

Routine bacterial culture (HVS, LVS, Penile) - Use swabs provided (with transport medium in container) or see section 7.20 for routine bacterial culture.

7.16. FUNGAL/MYCOLOGY SPECIMENS

7.16.1. Skin

Usually epidermal scrapings are received in the lab. Please use DermaPack fungal transport system. These should be received in a dry state, either in paper or in a sterile universal container.

7.16.2. Nail

Nail clippings are the most common samples received. These again should be received in a dry state. Please use DermaPack fungal transport system.

7.16.3. Hair

As for skin and nail.

7.16.4. Sputum and Bodily Fluids

Fresh sputum should be collected into sterile containers. Usually, three consecutive samples should be processed. All body fluids for mycology should be collected into sterile containers.

7.17. PLEURAL FLUID

Send in sterile universal containers.

7.18. PUS

Transport to microbiology ASAP to avoid loss of anaerobic organisms.

Never send swabs of pus when the pus is of sufficient quantity to be aspirated using a plastic syringe. Transfer pus into sterile universal container and send to lab. Do not send syringe needle – sharps hazard.

7.19. SPUTUM

- Routine culture: Send sputum in white screw-capped plastic 30ml/60 ml container
- TB culture: Three consecutive early morning sputum specimens
- Tracheal aspirates, bronchial lavage/washings should be sent in a leak proof container.

Please note: salivary specimens do not provide reliable culture results hence should be avoided wherever possible.

7.20. SWABS

- Routine bacteriology: Use swabs provided (with transport medium in container)

- Virology (e.g. vesicle fluid): Use viral transport medium (available from Microbiology)
- Pertussis PCR Use pernasal swab (Dacron™ with flexible wire shaft) or nose/throat swab in VTM

Epidemiological screening swabs MRSA; MSSA; CPE; VRE; GAS; GBS carriage; Use swabs provided (with transport medium in container) refer to infection control for sites swabbed.

7.21. ROUTINE SEROLOGY

Require Brown Gel tube for:
Tests analysed on site at Whiston:

- Hepatitis A, IgM and total antibodies
- Hepatitis B surface Antigen,(Current Infection)
- Hepatitis B core Antibody (Past Infection)
- Anti Hepatitis B surface Antibody (Immunity status following vaccination)
- Hepatitis C Antibody (Current / Past infection)
- Syphilis screen (Current / Past infection)
- HIV (Current / Past infection)
- Rubella IgG Antibody (Past infection / Vaccination)
- Rubella IgM (current infections)
- Measles IgG (Immunity)
- Mumps IgG (Immunity)
- Varicella Zoster (chickenpox) IgG (Immunity)
- CMV IgM and IgG
- EBV IgM and IgG
- Toxoplasma total antibody
- Parvovirus IgG and IgM
- Lyme IgG and IgM

ABNORMAL RESULTS ARE REFERRED TO REGIONAL VIROLOGY LAB

7.21.1. Antenatal samples for infectious diseases in pregnancy screening (IDPS) and consent

All screening samples must complete Family Origins Questionnaire (FOQ) where informed consent for the IDPS can be recorded.
Guidance for requesting antenatal samples for infectious diseases in pregnancy screening (IDPS):

Data field	Information required for IDPS antenatal screening request
Type of sample	Sample should be identified as ANTENATAL SAMPLE
Identification of the pregnant women	Request form and sample must be labelled with 3 patient identifiers 1. **First and Last Name** 2. **Date of Birth** 3. **NHS Number and/or Hospital Number** Address should be provided and may be accepted as 3rd identifier if NHS number or hospital number not available. Samples must be completed with same identifiers as on the request form **Please note sample will be rejected if request form and samples are not identified with 3 patient identifiers.** In addition please also provide: • Estimated date of delivery (EDO) • GP name and/or GP code

Name/location of requesting individual and where to send the results	Name if person completing request Location of requester – ANC/GP surgery etc. Maternity unit booked for delivery Results & report to name and location is different to that stated above
Name date and time of specimen	• Name and location of person taking the sample • Date and time of sample collection
Identification of priority status	• initial antenatal screening sample • initial sample taken after previous declined • repeat antenatal sample (inadequate first sample) • repeat sample to exclude recent infection
Examination requested	Known positive infection status should be stated on the requests. Informed consent is taken by healthcare professional completing Family Origins Questionnaire, where it is recorded whether patient has accepted or declined testing for infectious diseases. Declining of any specific screening tests for the above tests should be clearly stated on this form.
Clinically relevant information	Clinical indication for urgent sample request

Taken from NHS Infectious Diseases in Pregnancy Screening Programme Lab Handbook 2016 to 2017.

7.22. SEMEN ANALYSIS

Department follows the guidance set in the WHO laboratory manual for the examination and processing of human semen, sixth edition published July 2021, click here.

Please use semen collection pack provided by the laboratory.

7.22.1. Post-vasectomy specimens

Please follow instructions in collection pack and only use container provided.

Specimen request form must state patient's name, address, unit number and specimen number (i.e. whether specimen is first or second sample). Samples must be handed to a member of the Andrology staff based at Whiston Hospital, Pathology department, Nightingale house. Please attend Pathology visitors reception and call extension provided, between 08:30 - 11 am Tuesdays and Thursdays No appointment necessary (click to view) - Patient Information Leaflet.

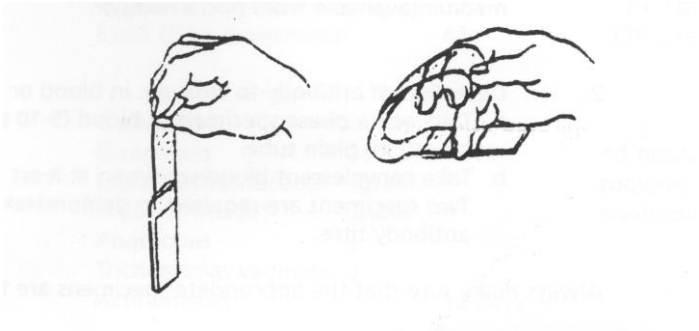
7.22.2. Infertility specimens

Patient must be provided with semen collection pack – for infertility provided by the laboratory. The patient MUST telephone the laboratory (0151 290 4123 or 0151 430 1837) to make an appointment (i.e. to ensure that a trained member of staff is available to examine the fresh specimen so that it isn't wasted). Appointments are only available on certain weekdays. The specimen must be received in the laboratory within 45 minutes of ejaculation for accurate results. The patient must not have had sex or masturbated in the past 48 hours. They should not have abstained from sex for more than 7 days. A sheath or condom must not be used. Normal ranges for results are printed on the laboratory report form. Full details are on the Patient Information Sheet (click to view).

7.23. THREADWORM

Sellotape slide.

1. Early morning specimen recommended
2. Apply clear sellotape to the perianal region, pressing the adhesive side firmly against the left and right perianal folds several times.
3. The tape can be wrapped around a tongue depressor to aid collection.
4. Smooth the tape on to the slide, adhesive side down
5. Wash hands (Threadworm ova are very infectious



7.24. TISSUE

Transport directly to microbiology; notify microbiology on extension 1837/ 1652 (out of hours) of urgent samples or via switchboard during out of hours.

Never add formalin to specimens for microbiology. Even traces of formalin in the container can prevent the isolation of pathogens.

Use a sterile container and label it clearly 'Microbiology' to prevent any mix-up with specimens intended for histopathology.

7.25. URINE

7.25.1. How to collect and store urine samples – guidance for patients – please click here (link to NHS choice)

Always follow the Urinary Tract Dipstick Algorithm. Bacteriology use Green V-Monovette container. For viral PCR use a sterile universal bottle. Do not use sputum containers as these do not hold liquids. Always state the nature of the specimen e.g. MSSU, CSU, clean catch, nephrostomy urine etc.

Sterile Pyuria
Sterile Pyuria, essentially it is the presence of elevated numbers of white cells in a urine (for our laboratory methods >40 WCC x106/L) but appears sterile using standard culture techniques. Please contact the laboratory for further information.

7.25.2. CSU (Catheter Specimen of Urine)

Do not send urine from the collection bag, use the sampling port. Only send CSUs from patients who have clinical features of urinary tract infection: the only exception to this should be CSUs sent as a part of MRSA screening. Do not perform dipstick/ward tests on samples from catheters as these will

invariably be positive even in patients without urinary tract infection. Do not send "removal of catheter" specimen of urine. An MSSU taken 1-2 days later is a much more useful specimen.

7.25.3. MSSU (Mid-Stream Sample of Urine)

Clean vulva/meatus prior to collection of specimen. Collect the midstream specimen of urine. Transport urine specimens to the laboratory in Green V-Monovette container within 2 hours or ensure they are refrigerated.

7.25.4. TB Culture

3 consecutive early morning urines should be sent in separate sterile 250ml containers. Urine specimens should be collected in the early morning on three consecutive days in CE marked leak proof container (that does not contain boric acid) - available from the laboratory.

7.25.5. Legionella/Pneumococcal Antigen

Urine should be sent in sterile universal container.

7.26. VIROLOGY/SEROLOGY

For viral serology requests not processed at Whiston, please use microbiology request forms, Careflow or ICE to request serology investigations. Complete clinical information and date of onset, otherwise the specimen will not be processed.

7.26.1. Detection of Respiratory Virus by Polymerase Chain Reaction (PCR)

For respiratory viral PCR (including influenza virus) please send nose and throat swab in one vial of viral transport medium. Please give relevant clinical details especially pregnancy.

Swabs must be sent to the laboratory in viral transport medium (available from Microbiology).
Samples are routinely analysed 24/7, please do not delay sending samples.

7.26.2. Detection of SARS-CoV-2 by Transcription Mediated Amplification TMA and Polymerase Chain Reaction (PCR) (see section 7.30 for further details)

Please send combined nose and throat swab in viral transport medium. Samples must be sent in accordance with guidelines detailed at: https://covid.sthk.nhs.uk/ and instructions provided with Covid swab kits.

Swabs must be sent to the laboratory in viral transport medium (available from Microbiology).

Samples are routinely analysed 24/7, please do not delay sending samples.

Swabs must be sent to the laboratory in viral transport medium (available from Microbiology).

Samples are routinely analysed 24/7, please do not delay sending samples.

7.26.3. Detection of Antibody e.g. in Blood

COVID-19 antibody testing service to check if you've had COVID-19 closed in March 2022, please check UK.GOV website for current information **click here.**

7.26.4. Detection of Viral Loads in blood

Please send 5-10 ml of EDTA blood sample. Requests are referred to Public Health England Laboratory.

7.27. TURN-AROUND TIMES FOR MICROBIOLOGY SPECIMENS

7.27.1. Microbiology Processed at Whiston

INVESTIGATION	Organisms	Reporting times	
		Minimum	Maximum
FAECES	Salmonella, Shigella, Campylobacter	<24 hours if PCR negative	72 hours if PCR indicates further work is needed
	Cryptosporidia, OC&P	<24 hours if PCR negative	72 hours if PCR indicates further work is needed
	Cholera, Yersinia	72 hours	3 weeks
	Clostridium difficile	<24 hours	
	E.coli 0157	<24 hours if PCR negative	72 hours if PCR indicates further work is needed
	Adenovirus and rotavirus antigen detection	24 hours	72 hours
	Helicobacter pylori antigen detection	24 hours	96 hours
	Norovirus	24 hours	48 hrs
Blood Cultures		Interim report issued at 36 hrs post incubation for negative blood Cultures.	Final Report: 5 days
GENITAL TRACT SWABS (HVS, IUCD, Penile)	Candida species	48 hours	72 hours
	Group B streptococci	24 hours	72 hours
	N.gonorrhoeae	48 hours	5 days
	Trichomonas vaginalis	24 hours	72 hours
	Actinomyces	10 days	

PUS/WOUND / SWABS	Routine culture and Gram stain	48 hours	96 hours
	(Actinomyces culture)	10 days	
MRSA SCREENS	MRSA	24 hours	72 hours
Sexually Transmitted Infections	Chlamydia N.gonorrhoeae M. genitalium HSV T. vaginalis	24 hours	96 hours
SPUTUM	Gram stain and routine culture	24 hours	72 hours
	Mycobacterial culture	Microscopy within 1 week, interim culture within 6 weeks	10 weeks
URINE	Routine culture	24 hours	48 hours
	Microscopy	< 24 hours	
	Mycobacterial culture	Initial culture within 6 weeks	10 weeks
SWABS	Nose	24 hours	72 hours
	Throat	24 hours	72 hours
	Ear	48 hours	96 hours
	Eye	24 hours	72 hours
	Pertussis PCR	7 days	10 days
SWABS (Nose and Throat)	SARS-CoV-2 Antigen Detection by PCR/TMA	24hrs	48hrs (May be subject to change depending upon reagents supplies allocated by NHSE *).
FUNGAL CULTURE Skin scrapings Nail clippings	Microscopy	24 hours	72 hours
	Culture	2 week	4 weeks
ASOT		<24 hours	72 hours
SEROLOGY	Mumps, Measles, VZV, EBV, CMV, Toxoplasma, Parvovirus, Lyme,	24 hours	72 hours
ANTE-NATAL SCREENING	**Hep B, HIV and Syphilis**	**24 hours**	**8 days**
ANDROLOGY Semen Analysis	Infertility analysis	7 days	10 days
	Post vasectomy analysis	24 hours	24 hours

*Limited number of rapid tests may be available with shorter TAT, please contact the department for current requesting guidance and availability.

To help attain these target turnaround times please clearly label samples and request cards with patient details: Full name, DOB, Hospital/NHS Number and/or address and sender information;

consultant and ward plus relevant clinical details including details of recent/current antimicrobial treatment and date and time of sample collection.

All significant positive results from blood, CSF, faeces (inpatient), TB cultures are telephoned to sender by Medical Microbiologist. Positive faeces results from GP requests are only telephoned when further action with regards to management of the patient is required.

7.27.2. Virology and Serology

Turnaround Times

Turnaround time = time from receipt of specimen into the laboratory to 90% of reports leaving the laboratory.

SPECIMEN TYPE	90% TURNAROUND
Non - Viral Serology	
Syphilis	3 days
Brucella	14 days
Legionella urine antigen	2 days
Viral Serology **Processed at Whiston, please notify medical staff of any urgent serology requests**	
Rubella Screen	Up to 2 days
Hepatitis B surface antigen screen*	Up to 3 days
Hepatitis B Immunity	Up to 3 days
Hepatitis B Markers	Up to 3 days
Hepatitis A and C	Up to 3 days
HIV Serology Screen*	Up to 3 days
Varicella-zoster Immunity Screen (IgG)*	Up to 3 days
CMV IgM and IgG	Up to 3 days
EBV IgM and IgG	Up to 3 days
Measles IgG*	Up to 3 days
Mumps IgG	Up to 3 days
Toxoplasma	Up to 3 days
Lyme IgG and IgM	Up to 3 days
Parvo IgG and IgM	Up to 7 days
Flu PCR	1 day
Teicoplanin Antibiotic Assay	Up to 3 days

Results for specimens requiring testing by Reference Laboratories will take longer.

*** Urgent results may be obtained on the same day after consultation with a Consultant Microbiologist**

7.28. REFERRAL LABORATORIES

INVESTIGATION	REFERENCE CENTRE	TURNAROUND TIME (TAT)	UKAS Accreditation Status
Acanthamoeba PCR	Micropathology Ltd University of Warwick Science Park Venture Centre Sir Williams Lyons Road Coventry CV4 7EZ	2 days	ISO15189 UKAS accredited 9622
Antibiotic Assays **Amikacin** **Tobramycin**	Royal Liverpool Childrens Hospital Alder Hey Eaton Road Liverpool L12 2AP Telephone: 0151 252 5488	1 day	ISO15189 UKAS accredited 9091
Aspergillus pptns **Avian pptns** **CD4** **Farmers Lung serology** **TB Quantiferon**	Department of Immunology Clinical Sciences Centre Manchester Royal Infirmary Oxford Road Manchester M13 9WL	5-11 days	ISO15189 UKAS accredited 8195
Arbovirus Abs **Chikungunya Abs** **Coxiella Abs** **Dengue Abs** **Hanta virus** **Leptospira/Weils disease** **Rickettsia Abs** **West Nile Abs** **Zika virus**	Rare & Imported Pathogens Laboratory Public Health England Manor Farm Road Porton, Wiltshire SP4 0JG	4 -10 days	ISO15189 UKAS accredited 9304
Amoebic IFAT **Hydatid CFT**	Liverpool School of Tropical Medicine Diagnostic Parasitology Laboratory Pembroke Place Liverpool L3 5QA Telephone: 0151 705 3220	Max 7 days	ISO15189 UKAS accredited 9362
Brucella	Liverpool Clinical Laboratories Microbiology reception, Ground Floor Royal Liverpool & Broadgreen UH NHS Trust Duncan Building Prescot Street L7 8XP	No TAT stated	ISO15189 UKAS accredited 9756

Complement Fixation Test (CFT)	Liverpool School of Tropical Medicine Diagnostic Parasitology Laboratory Pembroke Place Liverpool L3 5QA Telephone: 0151 705 3220	Max 7 days	ISO15189 UKAS accredited 9362
Creutzfeldt-Jakob Disease	The National Creutzfeldt-Jakob Disease Research & Surveillance Unit Western General Hospital Crewe Road Edinburgh EH4 2XU	No TAT stated	No UKAS accreditation
16S rDNA PCR	Microbiology Department Level 4 Camelia Botnar Laboratories Great Ormond Street Hospital NHS Foundation Trust Great Ormond Street London WC1N 3JH	7 days	ISO15189 UKAS accredited 8675
Fungal Serology and Culture **Antimicrobial assays** **Chloramphenicol** **S-Flucytosine** **Streptomycin**	Mycology Reference Laboratory National Infection Services PHE South West Laboratory Science Quarter Southmead Hospital Bristol BS10 5NB	1-15 days 48 hours	ISO15189 UKAS accredited 8043
HLA B57	Transplantation Lab Manchester Royal Infirmary Oxford Road M13 9WL	No TAT stated	ISO15189 UKAS accredited 7878
Meningococcal PCR **Meningococcal typing & Virology**	Meningococcal Reference Unit PO Box 209 Clinical Sciences Building Manchester Royal Infirmary Oxford Road Manchester M13 9WZ Telephone: 0161 276 6757/6758	3 days	ISO15189 UKAS accredited 8393
Parasite serology	Department of Clinical Parasitology Hospital for Tropical Diseases 3rd Floor Mortimer Market Centre Mortimer Market, London WC1E 6JB	10 days	ISO15189 UKAS accredited 9702
Pneumocystis pneumonia **TB culture**	Virology Department Manchester Royal Infirmary Oxford Road Manchester M13 9WL	3-5 day	ISO15189 UKAS accredited 8393

Urgent TB Microscopy	Telephone: 0161 276 8788/8854	1 weeks culture (incubation continues for up to 10 weeks) 2 hours (prior arrangement required)	
HIV Confirmation **Torch screen (CMV, EBV, Syphilis, Rubella, Parvovirus, Toxoplasma** **Other virus serology** **Viral resistance and genotyping** **Tissue Culture**	Virology Department MRI Clinical Sciences Buildings Oxford Road Manchester M13 9WL	3-5 days 3 days 3 days 5 days 5 days up to 14 days	ISO15189 UKAS accredited 8393
Specific antibodies	Virology Department Manchester Royal Infirmary Oxford Road Manchester M13 9WZ Telephone: 0161 276 8788/8854	Up to 5 weeks	ISO15189 UKAS accredited 8393

For any tests not listed please contact the department.

7.29. MEASUREMENT OF UNCERTAINTY (MICROBIOLOGY)

Uncertainty of measurement is a quantitative indication of the analytical variability of a result. The uncertainty may need to be taken into account when interpreting data. Systematic assessment of the factors influencing the result and of the uncertainty forms a key part of method validation.

In laboratory testing there are potential "uncertainties" that may affect test results (for example, specimen not collected correctly, sample transport delays, presence of antimicrobials, biological variation). Additionally factors within the laboratory may lead to variation (for example, incubation times, counting chamber and other laboratory factors).

The Microbiology laboratory has measures in place to minimise the level of uncertainty in any test result and also participates in internal and external Quality Assurance.

All results provided by the Microbiology Laboratory are representative of the sample tested and results must always be considered against clinical presentation.

Microbiology periodically review and measure elements that may contribute to uncertainty in the Microbiology examinations, please contact the department for further information.

7.30. SARS-CoV-2 /COVID-19 TESTING

Coronavirus disease (COVID-19), also known as SARS-CoV-2, is an infectious disease caused by a newly discovered coronavirus. Please note Covid Antibody testing is no longer available.

7.30.1.1. Sample Collection

Sample Container

Please use the COVID-19 PCR collection packs available from pathology reception. These contain a swab(s) and viral transport media. Please collect nose and throat swabs and break these off into the viral transport media, if only one swab is provided sample the throat followed by the nose. Please see guidance on how to collect samples via the Trust website at: https://covid.sthk.nhs.uk/sampling-guidance/

Requesting

Requests should be made using Careflow. If Careflow is unavailable then handwritten requests on blue microbiology forms will be accepted, provided they have three patient identifiers and clearly state 'COVID-19 PCR'.

7.30.1.2. Receiving Results

Results should be available within 24 hours and can be viewed on Careflow or Review.

7.30.1.3. Results

SARS-CoV-2 RNA Detected

SARS-CoV-2 RNA Not detected

Invalid
There has been a technical error within the machine and has produced an invalid result, please send a repeat swab.

8. CELLULAR PATHOLOGY

8.1. CONTACT NUMBERS (Including clinical advice)

8.1.1. During Normal Working Hours

General	
Consultant Histopathologist	0151 430 **1824**
Specialist Registrars	0151 430 **1824**
Service Manager	0151 432 **2372**
Operational Manager	0151 430 **1916**
Histopathology	
Secretaries (Report enquiries)	0151 430 **1824**
Technical and Frozen section requests	0151 430 **1828**
Cytology	
Secretaries (Report enquires) Non -Gynae	0151 430 **1824**
Mortuary	
Mortuary Whiston	0151 430 **1954**
Mortuary Southport	01704 70 **4014**
Mortuary Ormskirk	01695 65 **6745**
Bereavement Office Whiston	0151 430 **1336**
Bereavement Office SDGH/ODGH	01704 70 **4135**
Coroner's Officers Sefton	0151 934 2399
Coroner's Officers Lancs	01257 246 207
Consultant Pathologist	0151 430 **1824**

For patients who die in the hospital staff should refer to the Trusts "Care of the Deceased Policy" for the correct procedure to follow.

8.1.2. Out of Hours

Mortuary

Out of hours service is available by contacting the on-call Mortuary Technician via Switchboard.

Histology/Cytology

The Histology/Cytology laboratory is open 7 days a week for sample reception and preparation. Urgent out of hour's requests for Histopathology may only be made through the Consultant Histopathologists who can be contacted via switchboard.

8.2. DEPARTMENTAL NORMAL WORKING HOURS

Histopathology /Cytology 08.00 am – 8.00 pm (Mon – Fri)
08:00 am - 04:00 pm (Sat & Sun)

HISTOPATHOLOGY SAMPLES
Please refer to relevant sections below of the user guide/handbook and the references:

8.2.1. Requests

All specimen containers **must** be appropriately identified with:

- Full name
- date of birth/patient identification number (NHS number or Hospital number)
- location of patient
- site of specimen

and accompanied by a legible completed request form detailing:

- patient identification (name, date of birth, hospital or NHS number, address and postcode)
- location of patient
- site of specimen
- date taken
- time taken
- clinical details are mandatory
- previous histology/cytology number (where available or relevant)
- signature of requester

Patient identifiers on the request form must match identifiers on the sample pot.

Details of hazard status, where relevant, must be indicated on **both** the request form and specimen container.

Inadequately labelled specimens/incomplete request forms will **not** be accepted by laboratory staff and will be returned to the sender. This will result in delay in reporting the specimen.

Requests for urgent specimen processing and reporting must be clearly indicated on the request form and the department contacted (0151 430 **1828**).

Specimens in 60 ml and 120 ml pots should be placed into a small orange hazard bag if routine. If the sample is urgent the pot should be placed into a small blue urgent bag.

8.2.1. Turnaround Times for Histology

The department will endeavour to report 85% urgent biopsies within 7 calendar days and 85% routine samples within 30 days. Specific cancer pathway targets are monitored monthly as part of the departmental key performance indicators and data is shared within Trust cancer Pathway meetings. The department is committed to working towards turnaround times to support the governments faster diagnosis standard.

8.2.2. Specimen Fixation

All tissues for routine histological examination should be placed immediately in 10% buffered formalin. The container should be of adequate size and the volume of formalin used should be at least ten times the volume of the specimen. Pre-filled 60 ml specimen containers should be used for biopsies only and 120 ml for small specimens e.g. skin.

Please refer to Trust Policy STHK0176 Use and Safe Handling of a Formaldehyde Solutions Policy available on the Trust Intranet.

Remember that tissue samples for **Microbiology MUST NOT** have formalin added.

8.2.3. Supplies

Hospital

Stocks of pre-filled 60 ml and 120 ml containers, empty specimen containers, and 5 litre containers of formalin and small blue or orange hazard bags are supplied by the laboratory. Please contact the laboratory by email: Formalinpots.Request@STHK.nhs.uk

GP/Outpatients

For supplies of pre-filled specimen pots, please contact the laboratory by email: Formalinpots.Request@STHK.nhs.uk.

8.2.4. Frozen Sections

Frozen sections are available by arrangement **giving at least 24 hours' notice.**

To book a frozen section contact the laboratory using one of the following numbers:
Whiston site 0151 430 1828

Specimens for frozen section must be brought fresh and unfixed immediately and directly to the laboratory. If a booked frozen section is no longer required then the laboratory should be informed. Unbooked frozen sections will only be performed at the discretion of the Pathologist.

Please note – Danger of Infection specimens will not be accepted.

8.2.5. Immunofluorescence Studies

Skin specimens for Immunofluorescence (IMF) should be sent in 30 ml Michel's transport medium; sample must be received in the lab within 72 hrs; supplies are available from the Histology department on the Whiston site by emailing Formalinpots.Request@sthk.nhs.uk.

8.3. Pregnancy Loss Specimens and Non-Viable Fetuses

(up to end of 15 weeks gestation) Pregnancy Loss Specimens up to 23 Weeks and 6 Days Gestation

For fetuses up to 15 weeks and 6 days gestation the specimen must be put into formalin (see exceptions) and sent to Histopathology accompanied by the relevant paperwork (see details below of required paperwork for each hospital site). For fetuses 16 weeks or over the fetus should be dry only the placenta should be placed in formalin and sent to the Mortuary accompanied by the relevant paperwork (see details below of required paperwork for each hospital site)

8.3.1. Paperwork/Consent Requirements

For pregnancy loss specimens up to 23 weeks and 6 days gestation

- Completed Histology request form
- White completed copy of consent form 10
- Section A is for pregnancies under 13 weeks gestation
- Section B is for pregnancies up to 23 weeks and 6 days gestation

- Refer to Procedure for the Cremation of the Non-viable foetus (available on the intranet) for completion of the Consent form.
- This form is required even if the patient has chosen not to have any Histological examination carried out
- Pregnancy loss specimens should be sent with a 'certificate of medical practitioner in respect of non-viable foetus' form

8.3.2. Placentas for Examination at Alder Hey

Should be placed in formalin and be accompanied with a completed histology request card and Alder Hey form for examination of a placenta.

8.3.3. Social Termination Samples Generated at SDGH/ODGH

Should be transported to the onsite Mortuary for sensitive disposal

Fetuses > 13 weeks (S&O) or 16 weeks (St Helens & Whiston) gestation requiring examination at Alder Hey

- Alder Hey consent form
- Completed Alder Hey request form
- Any relevant copies of mother's notes
- Consent Form 10

Pregnancy loss specimens > 24 weeks please refer to the post mortem section.

Fetuses taken from the ward by the parents should not be placed in formalin.

Remember that once in formalin, cytogenetic and microbiological investigations are no longer possible.

8.4. REVIEW OF ARCHIVAL MATERIAL

It is usually possible to access the past 30 years provided that the laboratory number, including the year, is supplied.

8.5. NON-GYNAE CYTOLOGY

8.5.1. Requests

Please refer to relevant sections below of the handbook and the references:

All specimen containers **must** be appropriately identified with:

- name
- date of birth/patient identification number
- location of patient
- site of specimen

Accompanied by a legible completed request form detailing:

- patient identification (name, date of birth, hospital or NHS number, address and postcode)
- location of patient

- site of specimen
- date taken
- time taken
- clinical details are mandatory
- previous histology/cytology number (where available or relevant)
- signature of requester

Details of hazard status, where relevant, must be indicated on **both** the request form and specimen container.

Inadequately labelled specimens/incomplete request forms will **not** be accepted by laboratory staff and will be returned to the sender. This will result in delay in reporting the specimen.

Requests for urgent specimen processing and reporting must be clearly indicated on the request form and the department contacted (0151 430 **1828**).

8.5.2. Samples

All Specimens must be appropriately identified and accompanied by a completed request form (see above)

Details of hazard status where relevant must be indicated on both the request form and specimen container.

Inadequately labelled specimens/incomplete request forms will not be accepted by laboratory staff.

Specimens should be transported to the laboratory on the same day as collection. Specimens should be refrigerated if transport is delayed.

Please refer to Trust Policy STHK0176 Use and Safe Handling of a Formaldehyde Solutions Policy available on the Trust Intranet.

8.5.3. Fine Needle Aspiration Cytology

Spread material onto glass slides labelled in pencil with the patients name and date of birth. Depending on the amount of material available, both air-dried and wet-fixed preparations should be prepared. For wet-fixed preparations slides should fixed immediately with cytology fixative. After slide preparation, rinse the needle contents in CytoRich Red preservative fluid, dispose of the needle safely (do not leave in the bottle). **Note on the slides whether the preparations are air-dried or fixed.**

Aspiration cytology kits are available from the Cytology Department.

8.5.4. Body Fluid Cytology

Collect specimens into sterile universal containers. The department will not accept bags, they will be returned not sampled. **UNIVERSALS ONLY**.

8.5.5. Urine Cytology

Urine cytology kits including full instructions for use are supplied by the Cytology Department. Do not discard the 10ml of ethanol fixative (clear fluid) provided in bottle supplied. Urine should be obtained at the beginning or end of voiding **not** early morning or mid-stream specimens. The minimum volume

for examination is 20 ml.

8.5.6. Sputum Cytology

Cytology of sputum samples will only be performed on patients with a clinical suspicion of lung cancer who are unfit for bronchoscopy. If the clinical details given do not indicate this, the specimen will **not** be processed. The specimen should be obtained from early morning deep cough sputum, before the patient eats, drinks or cleans their teeth, and collected into a sterile sputum pot

8.5.7. Endoscopic Brushings

Bottles containing 10ml of Cytorich red preservative are available from the Cytology Department. Push the brush beyond the end of the tube, cut through the tube at an appropriate length, and place the tube and brush into cytology preservative.

8.5.8. Endoscopic Washings

Collect specimens into sterile universal containers.

8.5.9. FNA Adequacy Assessment Service

The department also offers an FNA adequacy assessment service at head and neck clinics at Whiston Hospital and Ormskirk & District General Hospital.

8.5.10. Turnaround Times for Non-Gynae Cytology

Turnaround times for non-gynae cytology are within 7 calendar days from date the sample was collected, to the date first reported. The department is committed to working towards turnaround times to support the governments faster diagnosis standard.

8.5.11. Muscle Biopsies

Muscle biopsies to be processed by The Walton Centre Histology department please contact them on 0151 525 3611 to inform them of the request and they will supply an SOP. Samples should be sent by Taxi from sampling department due to time sensitivity.

8.6. GYNAECOLOGICAL CYTOLOGY

NHS CERVICAL SCREENING PROGRAMME

Call and recall for the Cervical Screening Programme are provided by PCSE (Primary Care Support England) Screening Preston, (telephone 01772 221344). Any queries about prior notification lists or patient recall should be directed to PCSE.

Samples taken in GP practices, sexual health services, extended access services and colposcopy services across Warrington, Halton, St Helens and Knowsley CCG localities are now analysed by **Manchester University NHS Foundation Trust laboratory (MFT)**.

Samples are collected using ThinPrep Liquid Based Cytology (LBC) and are screened for HPV – Human Papilloma virus.

Collected samples are transported to Whiston Hospital by the Trusts transport agent and from there they are transferred to MFT by courier.

For further Information please contact Manchester laboratory on **0161 276 5111**.

If you wish to **VIEW** the HPV primary screening PowerPoint presentation, this can be accessed via the Cervical Sample Taker Database (CSTD) http://cstd.mft.nhs.uk/
For technical support contact the IT support desk by email on labs.sd@mft.nhs.uk

To UNDERTAKE the new HPV primary screening training primary care and colposcopy staff can access this via e-learning using the following links:

E learning for primary care staff: https://portal.e-lfh.org.uk/Component/Details/559150
E learning for colposcopy staff: https://portal.e-lfh.org.uk/Component/Details/559152

8.7. POST MORTEMS

8.8. CONTACT NUMBERS

Mortuary Whiston	**0151 478 1954**
Mortuary Southport	**01704 70 4014**
Bereavement Office Whiston	**0151 430 1336 or 0151 430 1412**
Bereavement Office SDGH/ODGH	**01704 704135**
Coroner's Officers Sefton	**0151 934 2399**
Coroner's Officer Lancashire	**01257 246 207**
Consultant Pathologist	**0151 430 1824**

(SDGH = Southport District General Hospital, ODGH = Ormskirk District General Hospital)

8.8.1. Hospital Post Mortems

Hospital post mortems may be requested on any case not requiring a Coroner's post mortem (see below). Written consent must be obtained from the those in a qualifying relationship to the deceased next of kin and Consent Form 5 completed. A Death Certificate must be issued before the post mortem is performed. Hospital doctors involved with the patient's management should attend the post mortem and they will be contacted by the mortuary staff. Please refer to Hospital Policy available on the Trust Intranet: Procedure for Requesting Hospital Post Mortem Examination PD0106.

8.8.2. Coroner's Post Mortems

In some circumstances the case must be referred to HM Coroner e.g.

Death due to:

- accident
- suicide

- industrial disease
- drugs

Or death:

- under anaesthesia
- when the cause of death is not known, i.e. where a Death Certificate cannot be issued
- Deprivation of Liberty Safeguard is applied to the patient

In these circumstances the Coroner's Officers must be contacted. They will advise if a post mortem is required and, if so, will be responsible for issuing the Death Certificate. In suspected industrial disease deaths, the deceased's occupation or previous occupation **must** be noted for the Coroner's information. Written consent from family is not required for Coroner's post mortems, which are a medico-legal requirement.

In any event the Consultant Pathologists will be able to give advice. Stillbirths and perinatal deaths. This applies to babies delivered **from 24 weeks** gestation. Refer to the hospital procedure for the Cremation of Stillbirth infants (available on the intranet). For further information please contact the Head of Midwifery.

Fetal (13 weeks and over), perinatal autopsy and placental histopathology are undertaken at by Alder Hey Children's Hospital NHS Foundation Trust. Please refer to Trust policy STHK0328 Procedure for the Cremation of the non-viable fetus, available on the Trust intranet.

If only the placenta (not the fetus) from stillbirths and fetuses of 16 weeks gestation are to be sent to Alder Hey, the placenta should be in an appropriately sized specimen container and covered with formalin, a Whiston Histology request form completed and an Alder Hey ' Request for the examination of the placenta' form completed. The placenta and request forms are taken to the Histology department at Whiston. See below 3.33.4 Referred Laboratories.

8.8.3. Post Mortem Alcohol Levels.

Post Mortem alcohol levels performed by the department are not accredited to ISO15189.

8.9. REFERRAL LABORATORIES

Reference Centre	Investigation	Turnaround Time	Referral centre UKAS status
Histology Department **Alder Hey** Children's NHS Foundation Trust Eaton Road Liverpool L12 2AP Telephone: 0151 292 3656	**Post Mortem Examination of Fetuses from 16 weeks gestation** **Post Mortem Examination of Stillbirths** **Histological examination of Placentas**	At least 16 weeks	**ISO15189 - 9091**
Histology Department **Immunohistochemistry** Department **Royal Liverpool University Hospital** 5th Floor, Duncan Building Prescot Street Liverpool L7 8XP Telephone 0151 706 4483 Fax 0151 706 5859	**FISH Testing** **EGFR** **PDL-1** **Colorectal MMR** **NSCLC**	14 working days	**ISO15189 – 7924**
Histology Department **Royal Liverpool University Hospital** 5th Floor, Duncan Building Prescot Street Liverpool L7 8XP Telephone 0151 706 4483 Fax 0151 706 5859	**Lung Tissue for Asbestos fibres**	98% within 2 weeks of receipt	**ISO15189 – 7924**
HODS **Royal Liverpool University Hospital** 5th Floor, Duncan Building Prescot Street Liverpool L7 8XP Telephone 0151 706 4483 Fax 0151 706 5859	**HODS**	Urgent: 14 days Routine: 21 days	**ISO15189 – 7924**
Ophthalmologic Pathology Department **Royal Liverpool University Hospital** 5th Floor, Duncan Building Prescot Street Liverpool L7 8XP Telephone 0151 706 4483 Fax 0151 706 5859	**Eye Pathology**	Up to 20 working days	**ISO15189 - 7924**
Northwest Genomic Laboratory Hub (Liverpool) Manchester Centre for Genomic Medicine Liverpool Women's Hospital Crown Street, Liverpool	**Colorectal BRAF & MLH-1 hypermethylation**	14 days	**ISO15189 - 9322**

L8 7SS			
Central Manchester University Hospitals Regional Genetics Laboratory Services Genetic Medicine (6th Floor) St Mary's Hospital Oxford Road Manchester M13 9WL	**KRAS** **BRAF (melanoma)** **Lung NGS** **BRCA** **Colorectal MSI** **GIST** **HRD**	5 working days 14 days	**ISO15189 - 9865**
Royal Brompton & Harefield Pathology Department Sydney Street London SW3 6NP TEL: 020 7351 8425	**Sudden Cardiac Death specimens**	14 days	**ISO15189 - 8818**
Genomic Healthcare Inc. 301 Penobscot Drive, Redwood City, CA 94063, USA	**Tissue block for Oncotype DX**	7-10 days from receipt of sample	**ISO15189 – 3922.01**
The Walton Centre for Neurology and Neurosurgery NHS Trust Lower Lane Fazakerley Liverpool Merseyside, L97LJ	**Brain / Spinal cord**	90% within 5 working days	**ISO15189 - 8642**
Source Bioscience. Pathlore, Medical Solutions PLC, 1 Orchard Place, Nottingham Business Park, Nottingham, NG8 6PX	**Gastric HER2**	Up to 7 days	**ISO15189 - 9571**

8.10. MEASUREMENT OF UNCERTAINTY (CELLULAR PATHOLOGY)

All types of measurement have some inaccuracy due to bias, imprecision and operator variation.

In histopathology reports in particular qualitative data are generally of greater significance, however in certain situations quantitative measurements become critical of diagnosis and prognosis.

Measurements in histology can be made with either:-

- A ruler, for example, macroscopic measurements of tissues, tumours and excision margins.
- Eyepiece graticule in a microscope, for example, measuring microscopic distances in tissue sections.

There will be a degree of variation in all such measurements and it is this uncertainty that should be considered when interpreting the final histology report. Where tumour sizes and excision margins have been measured there is a level of uncertainty in the measurement step.

For macroscopic tumour measurements we have calculated this variance to be +/- 3mm. In order to minimise this uncertainty of measurement a number assurances are incorporated into the process:

- Ensuring tumours are only measured in the largest dimension.
- Using calibrated rulers

For microscopic measurements we have calculated the variation in measurements to be minimal (variance 0.051)

It is important for clinical staff to have a full understanding of the uncertainty of measurement when they interpret the final histology report where tumour sizes and distances to excision margins are being used in the staging process and discussion at MDT is actively encouraged regarding measurements close to staging limits.

Final assessment of staging should be a clinical decision based on multiple information sources.

Please contact the department if further information required.

9. POINT OF CARE TESTING (POCT) SERVICES

The following POCT services are currently available.

- Blood Gas/Electrolytes/Co-oximetry
- Blood Glucose
- Urinalysis
- Pregnancy Testing
- HbA1c
- Haemoglobin
- Anti-Coagulation

No member of staff is to use any of this equipment until they have received adequate and recorded training, and refresher training as necessary. This is to comply with the Medical Devices Training Policy as well as the policy for POCT. In addition, some of this equipment is password protected, STAFF MUST NOT SHARE PASSWORDS.

9.1. ADVICE

For advice about existing POCT services or introduction of new devices please contact:

POCT Lead on Ext. 4317. From outside the Hospital 0151 290 4317.
Mobile number: 07342078105
Email: Pathology.Support@STHK.nhs.uk

9.2. MEASUREMENT OF UNCERTAINTY (POCT)

The calculation of the measurement of uncertainty (MOU) is undertaken by the POCT team through review and update at regular intervals. Information in relation to the MOU for POCT tests can be obtained by contacting a member of the POCT team as listed above.

9.3. Guidance on analysis of Arterial Blood Gas during Covid 19 Pandemic.

For guidance on syringe to use for on patients with suspected or confirmed COVID-19, see intranet page:
https://covid.sthk.nhs.uk/arterial-blood-gas-guidance/

10. REFERENCES

10.1. LABORATORY STANDARD OPERATING PROCEDURES (SOPs)

- Lab SOP Specimen Collection and Handling – Biochemistry – ID 6373
- Lab SOP Specimen Collection and Handling – Histopathology – ID 3716
- SOP 55 Specimen Collection and Handling – Haematology – ID 6269
- Lab SOP Specimen Collection and Handling – Microbiology – ID 6461
- Pre-Analytical Processing of Blood Science Requests –ID 1506
- Telephoning of Results SOP Biochemistry – ID 1909
- Guide to Add On Test Stability Biochemistry ID 10496

10.2. BIOCHEMISTRY ADD-ON TEST REFERENCES:

1. RX Daytona – Alpha-1-antitrypsin kit insert – AA 2471. Randox Laboratories Ltd., Co. Antrim, UK. 12/01/04 wpt.

2. Ono T, Kitaguchi K, Takehara M, Shiiba M, Hayami K "Serum-Constituents Analyses: Effect of Duration and Temperature of Storage of Clotted Blood" *Clinical Chemistry* 1981; **27** (1): 35 – 38.

3. Rehak NN and Chiang BT "Storage of Whole Blood: Effect of Temperature on the Measured Concentration of Analytes in Serum" *Clinical Chemistry* 1988; **34** (10): 2111 – 2114.

4. Johnson CE, Cohen IA, Bickley SK, Hyder DM "Stability of theophylline in human serum and whole blood" *American Journal of Hospital Pharmacy* 1984; **41** (10): 2065 - 2068. (Abstract only).

5. Use of anticoagulants in diagnostic laboratory investigations and stability of blood, plasma, and serum samples. WHO 2002.

6. Data supplied by NL/DF Derby City Hospital – see Equipment and Process Validation section of Q-pulse.

7. HA 9210 Operating Manual/SOP

8. Carboxyhaemoglobin Reference Range.
Source: www.michigan.gov/documents/cis_wsh_cet5010_90097_7.doc

Biochemist Other References:

9. UK Guidelines for the use of thyroid function tests. The Association for Clinical Biochemistry, British Thyroid Association and the British Thyroid Foundation. July 2006

10. American Gastroenterological Association. American Gastroenterological Association Medical Position Statement: Evaluation of Liver Chemistry Tests. Gastroenterology 2002; 123 : 1364-6.

11. Best practice in primary care pathology: review 5. W S A Smellie, J Forth, S Ryder, M J Galloway, A C Wood, I D Watson. J Clin Pathol 2006; 59: 1229-1237.

11. TRUST POLICIES

Please refer to Trust intranet for the current copies of the policies.

- Procedure for the Transportation of Specimens STHK0437 v6, 14.07.2021
- Minimum Criteria for Requisition, Collection, Reception and Examination of Pathology Samples STHK0133 v6.1, 08.07.2020.
- Purchasing and Point of Care Testing Devices STHK0055 v 9, 10.11.21
- Formaldehyde Solution Policy STHK 0176 v7, 26.01.22
- Policy for Actioning Pathology Results STHK0061 v7, 08.12.21
- Air Tube System STHK0197 v5, 07.12.2020
- Policy for Release of Pathology Samples to an authorised source (including police or H.M. Coroner) STHK 0107 v4, 06.12.21
- Procedure for Requesting Hospital Post Mortem Examination PD0106 v1, 05/04/2023
- Blood Transfusion Policy STHK1588 v1 07.012.2020
- Consent for Blood component and Blood product Transfusion and management of patients refusing consent STHK0839 v3, 13.11.2019
- Paediatric Transfusion Policy STHK1670 v1, 14.06.21

Please refer to Trust Intranet for current versions of these polices.

12. CHANGES MADE TO VERSION 32

Page	Changes made to version 32
	Administrative changes and links updates
2	Opening times for Cellular Pathology updated and Mortuary OOHs service information updated.
14/15	Section 2 Duplicate requesting and Retesting intervals. Updated information and added separate subsection for Biochemistry and Haematology.
16 - 18	Updated links to hospital site plans and images
19	Section 3.5 About Pathology Service: Updated 20 million tests done per annum.
19 -20	Section 3.5.1 Feedback. Added link to Pathology webpage and QR code for survey
24, 25 - 26	Section 3.8.6: List of clinic and times updated
27	Section 3.9.4 Specialised Phlebotomy updated opening times for Ormskirk Childrens ward for blood tests and added Ormskirk blood clinic will operate an appointment system from 1/12/24.
30 -31	Section 3.15.2: Updated pick up time for transport between sites. Removed 17:00 and 16:45 pick ups
47	Section 3.27.1 Consent for testing: Updated references to sections relating to consent, added sweat test and ANC IDPS and Sickle cell & Haemoglobinopathies.
47	Section 3.28 Updated to include Trust link to complaint information page. Added link to Pathology enquiry form on intranet and webpages.
49 - 50	Section 4.5.2 CSF, added comment to see section 5.17 for CSF Haematology tests
65 - 66	Added information regarding consent for sweat tests
97 98 99	Section 5.9. Haematology Biological Reference Intervals – updated as follows: Section 5.9.1 Updated FBCs reference ranges Section 5.9.2 Haematology Other Section 5.9.3 Added new section for Paediatric Coagulation reference ranges.
100	Section 5.10 Specimen Information Paediatric Reference Range added for coagulation
103	Section 5.11 updated with reference to informed consent is recorded on FOQ
114	Section 5.15 Haematology Action limits updated for Hb, Platelets and Neutrophils
113	Added abbreviation for test (MRD)
115	Section 5.16 Antenatal Screening Samples Requirements and consent. Add details about signatures and updated wording
115	Section 5.17 CSF Samples for Haematology - added information about immunophenotyping and cytospin and staining.
139	Section 7.13 CSF Microbiology Add comment to see section 5.7 CSF Haematology tests
143	Section 7.21 – removed Covid 19/SARS CoV2 antibody from list of serology tests Section 7.30 Covid 19 testing, added comment Covid Antibody testing is no longer available.

143 - 144	Section 7.21.1 Antenatal samples for IDPS Added comment: All antenatal screening samples must complete Family Origins Questionnaire (FOQ) where informed consent for the IDPS can be recorded. And updated paragraph: Informed consent is taken by healthcare professional completing Family Origins Questionnaire, where it is recorded whether patient has accepted or declined testing for infectious diseases. Declining of any specific screening tests for the above tests should be clearly stated on this form.
147	Norovirus TAT updated to 24 -48hrs
154	Section 8.1.1 Removed Coroner's office Whiston telephone and updated Coroners Sefton telephone. Section 8.1.2. Out of hours – updated information to say for all sites contact switchboard. Section 8.2 Updated Histopathology opening hours
155	Section 8.2.1 TAT information updated.
160	Section 8.8 Sefton Coroner telephone contact updated. Section 8.8.1 Updated to remove reference to S&O policy and Consent form 5 applies to all sites