LMn-GEN-0001 Rev. No. 22	Department of Pathology User Manual	Page 1 of 179 Effective Date: 14/02/2025
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DEPARTMENT OF PATHOLOGY

USER MANUAL

RECORD OF CHANGES TO THIS VERSION (21) OF THE USER MANUAL

Subsection	Details
Throughout	Remove reference to accreditation following AUD1611 14/02/2025
General: Pages 12 and 14	Update CMS Haematology

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GENERAL INFORMATION

HOSPITAL MISSION STATEMENT

"TO PROVIDE PATIENT-CENTRED QUALITY CARE, DELIVERED WITH INTEGRITY AND OPENNESS BY SKILLED, COMMITTED AND COMPASSIONATE STAFF"

1. INTRODUCTION

The purpose of this User Manual is to provide appropriate information for laboratory users.

It is envisaged that the information provided in this User Manual is sufficiently detailed to

- Provide laboratory users with a comprehensive understanding of the laboratory's scope of activities and requirements
- Ensure that the integrity of the sample is not compromised.

The information in this User Manual includes:

a) Location, operating hours and contact information – ref. **General Sections 2 & 3.**
b) Procedures for requesting and the collection of samples - ref. **General Section 6**
c) Scope of activities and turnaround times – ref. **relevant dept. section of this document.**
d) Availability of advisory services and assistance in interpretation of examination results -– ref. **General - Section 4**
e) Requirements for patient consent – ref. **General - Section 6.12**
f) Factors known to significantly impact the performance of the examination or the interpretation of the results – ref. **relevant dept. section of this document**.
g) Laboratory complaint process – ref. **General - Section 5**
h) Preparation of the patient (e.g. instructions to caregivers, sample collectors and patients) – ref. **General Section 6.15** and **Phlebotomy - Section 1** and **relevant dept. section of this document**
i) type and amount of the primary sample to be collected with descriptions of the containers and any necessary additives, and when relevant the order of collecting samples - - ref. **relevant dept. section of this document**
j) special timing of collection, where relevant - ref. **General Section 6.6, General Section 6.15** and **relevant dept. section of this document**
k) provision of clinical information relevant to, or affecting sample collection, examination performance or result interpretation (e.g. history of administration of drugs) - ref. **General Section 6.6, General Section 6.15** and **relevant dept. section of this document**
l) sample labelling for unequivocal identification of the patient, as well as source and site of sample, and labelling, when several samples from the same patient are to be collected, including multiple pieces of tissue or slides - ref. **General Section 6.14** and **relevant dept. section of this document**
m) the laboratory's criteria for acceptance and rejection of samples specific to the examinations requested -– ref. **General Section 6.13** and **relevant dept. section of this document**

The laboratory at Our Lady of Lourdes Hospital ensures, at all times, that patients' well-being, safety and rights are the primary considerations.

The Department of Pathology provides a comprehensive service to Our Lady of Lourdes, Drogheda, Louth County Hospital, Drogheda Cottage Hospital, nursing homes and the community in the region. It comprises of the following departments:

- Blood Bank (Blood Transfusion Laboratory & Haemovigilance)
- Haematology
- Biochemistry
- Microbiology
- Histology
- Phlebotomy
- Point of Care Testing

Any test requests that are not carried out on site are sent to appropriate referral laboratories. This User Manual is intended as a quick reference guide for Pathology Users including General Practitioners along with hospital based personnel in Our Lady of Lourdes, Drogheda and Louth County Hospital, Dundalk.

The Department of Pathology services undergo continuous review through quality assurance and audit activities. The department is committed to performing activities in accordance with the requirements of the international standard ISO15189:2022.

The laboratory complies with HIQA National Standards for Safer Better Care and the HSE Patient Safety Strategy.

Should you, as the user of the Pathology Service, have any queries for improvements in connection with any aspect of the service provided, staff members will be pleased to discuss these with you or alternately submit your comments/suggestions in writing to the Laboratory Manager or via email to tony.stringer@hse.ie.

2. HOURS OF OPERATION

Service	Days	Opening Hours
Blood Bank/Haematology/Biochemistry/ Microbiology/ POCT Routine Service Out of Hours Service (24hr service)	 Monday - Friday Monday – Friday Saturday, Sunday & Public Holidays	 08:00 - 20:00 20.00 – 08.00 hours 24 hours
Histopathology Department	Monday – Friday	08.00 – 17.15 hours
Haemovigilance Department Contact Blood Bank department for any emergency out of hours query, or in an emergency and it is not possible to contact the Haemovigilance Officer	Monday - Friday	09.00 – 17:00 hours
Phlebotomy Out-Patient Service (Last available appointment is 16:30 hours)	Monday - Friday	08.00 – 17:00 hours
Phlebotomy In-Patient Service	Monday – Friday Sat/Sun/Public Holiday	07.00 – 13:00 hours 07:00 – 14:00 hours
Laboratory Office	Monday - Friday	08:00 – 17.00 hours

Table 1*. Hours of Operation*

3. LOCATION & ACCESS

The Department of Pathology is located on the ground floor at the back of the main building. There is signage from the main reception which uses the term Laboratory to describe directions. The Laboratory is situated close to Radiology and opposite the Physiotherapy Department.

Access to the Department of Pathology is controlled via security swipe card access for hospital staff. Couriers, taxi drivers and general public delivering samples and blood to the Laboratory may gain access by ringing the bell which is clearly signposted at the double door entrance.

The Phlebotomy Department is located on the ground floor opposite the ante natal clinic.

5. USER SATISFACTION, FEEDBACK, COMMENTS, & COMPLAINTS, NEWSLETTER

The goal of the Department of Pathology is to ensure that our users receive accurate, reliable, meaningful and timely laboratory results.

Laboratory users are welcome at all times to provide information to aid the laboratory in the selection of the examination methods.

A complaints procedure, compliant with the requirements of ISO 1589:2022, is in place in the Laboratory Quality Management System. This procedure incorporates:

- A description of the process for receiving, substantiating and investigating the complaint, and deciding what actions will be taken in response
- Tracking and recording the complaint, including the actions undertaken to resolve it;
- Ensuring appropriate action is taken. The resolution of complaints can lead to implementation of corrective actions or be used as input into the improvement process
- Any complaints raised by users will be raised in this system, with a response issued as soon as possible.

If users encounter any problems with the services or have suggestions for service improvements, please contact the relevant staff member as listed below.

- Laboratory Manager: Tony.Stringer@hse.ie
- Relevant Chief Medical Scientist:
    - Haematology: Tony.Stringer@hse.ie
    - Microbiology: Haydn.Hammerton@hse.ie
    - Biochemistry: Aine.Egan@hse.ie
    - Histology: Roisin.Wheatley@hse.ie
    - Blood Bank: Ciara.Dowd@hse.ie
- Point of Care Manager: Claire.Marmion@hse.ie
- Laboratory IT Manager: Ronan.Dauria@hse.ie
- Laboratory Quality Manager: JoanneM.Duffy@hse.ie

In addition to these processes, with the goal of obtaining user feedback, from time to time we issue our users with “Satisfaction Surveys” for completion.

To ensure that laboratory users are kept up-to-date with service development, a newsletter is periodically sent to all service users, via HealthLink or hospital email.

The HSE also have a Comments and Complaints Policy titled “Your Service, Your Say” (available online or via Comment cards available in the hospital lobby), which can be used to a log a complaint as well as to compliment the service. Any feedback submitted via this forum, will be forwarded to the Laboratory Manager for investigation and response.

4. CONTACT DETAILS AND ADVISORY SERVICE

Where scientific advice is required on medical indications and appropriate selection of available tests, the Department of Pathology welcomes your queries. The Consultants &/or Medical Scientists can provide advice on the following:

- Choice of examination
- Use of service
- Required sample type
- Clinical indication
- Limitations of procedure
- Required frequency of testing
- Interpretation of results

For any questions use the provided listing, (Table 2. *Contact Details*) or hospital internal electronic phonebook.

Areas outside the hospital should make contact by dialling the Hospital Switchboard on 041 9837601 and then the relevant extension number.

There are three separate rotas providing the on call services (out of hour emergency services) – Blood Transfusion/Haematology, Microbiology and Biochemistry.

Position/Area	***Personnel***	***Extension Number***
Laboratory Director/ Consultant Haematologist	Dr. Barry MacDonagh	2086
Consultant Haematologist	Dr. Mary McCloy	2635
Consultant Microbiologist	Dr. Martha Trzos-Grzybowska Dr Roisin Connolly	2104
Consultant Histopathologist (Lead)	Dr. Ruth Law	6694
Consultant Histopathologist	Dr. Jane Thorne	2698
Consultant Histopathologist	Dr. Brianan McGovern	2328
Consultant Histopathologist	Dr. Peter Szontagh-Kishazi	2411
Consultant Histopathologist	Dr Eduardo Gavin	6830
Histopathology Registrars Room	*(Rotates)*	2540
Consultant Chemical Pathologist	Dr. Clodagh Loughrey	Via Switch
Laboratory Manager	Mr. Tony Stringer	5771
Blood Bank Chief Medical Scientist	Ms Ciara Dowd	2559

Position/Area	*Personnel*	*Extension Number*
Haematology Chief Medical Scientist	(Vacant)	2103
Biochemistry Chief Medical Scientist	Ms Aine Egan	4795
Microbiology Chief Medical Scientist	Mr Haydn Hammerton	2101
Histology Chief Medical Scientist	Ms. Róisin Wheatley	2331
Quality Manager	Ms Joanne Duffy	8466
Laboratory IT Manager	Mr. Ronan D'Auria	087 3746987
Haemovigilance Officers	Ms Grainne Gollogly Ms Stephanie Baker	087 4910503 087 4910507 2130
Senior Phlebotomist	Ms Cathy Foran	2182
Point of Care Testing (POCT) Manager	Ms. Claire Marmion	Claire.Marmion@hse.ie
Blood Bank	-	2559
Blood Bank Emergency Telephone	**-**	**2050**
Haematology Department	-	2103
Biochemistry Department	-	4795
Microbiology Department	-	2101
Histology Department	-	2331/2314
Specimen Reception	-	4741
Specimen Referrals	-	2560
Phlebotomy Department	-	2110
Laboratory Office	-	4661/2482/2615
Laboratory Fax Number	-	041 9838092
Hospital Switchboard	-	0

Table 2. ***Contact Details***

5. LABORATORY SUPPLIES

5.1 Supplies to areas within the Hospital

Most specimen bottles and request forms are supplied through the Stores Department. Those not supplied through the Stores Department can be obtained directly from the laboratory.

The specimen containers outlined in Table 3, below are available from the laboratory during the hours of 08:00 to 17:00 Monday to Friday:

- Blood Culture Bottles (Specimen Reception)
- All Histology Containers (Histology Department)
- 24 hour Urine Plain Containers (Specimen Reception)
- 24 hour Urine Acidified Containers (Specimen Reception)
- Aptima Kits (Specimen Referrals)
- SARS-CoV-2 Request Form & Swab (Microbiology Department)

Table 3. Specimen types available from the laboratory

5.2 Supplies to areas outside the Hospital

Supplies of specimen containers and request forms can be obtained directly from the Laboratory or they can be delivered by the Primary Care Service on sample collection days. *LF-GEN-0033 Requisition for Laboratory Supplies* can be obtained from the Laboratory and used for placing a supply order. One week's notice for delivery of supplies is required.

All requests for stock should be sent to antonio.nogueira@hse.ie

6. POLICY ON REQUESTING TESTS, LABELLING SPECIMENS / REQUEST FORMS & COLLECTING SAMPLES

6.1 General

This policy applies to all specimens being submitted for analysis across all Laboratory disciplines.

To ensure safe, accurate and clinically appropriate sample collection and pre-examination storage, this User Manual provides instructions for:

a) verification of the identity of the patient from whom a primary sample is collected – ref. **General Section 6.14**, below

b) verification and when relevant, recording that the patient meets pre-examination requirements [e.g. fasting status, medication status (time of last dose, cessation), sample collection at predetermined time or time intervals]; – ref. **General Section 6.6**, below

c) collection of primary samples, with descriptions of the primary sample containers and any necessary additives, as well as the order of sample collection, where relevant; – ref. **General Section 6.15**, below

d) labelling of primary samples in a manner that provides an unequivocal link with the patients from whom they are collected; – ref. **General Section 6.14, Section 6.15**, below

e) recording of the identity of the person collecting the primary sample and the collection date, and, when relevant, recording of the collection time; – ref. **General Section 6.6**, below

f) Requirements for separating or dividing the primary sample when necessary; – ref. **relevant departmental sections**, below. This activity is completed on receipt of samples in laboratory.

g) Stabilization and proper storage conditions before collected samples are delivered to the laboratory - ref. **relevant departmental sections**, below.

h) safe disposal of materials used in the collection process - ref. **General Section 6.15**, below

6.2 Laboratory Tests available at Our Lady of Lourdes Hospital

Refer to the relevant Departmental section of this User Manual for a complete list of tests available in individual laboratory departments.

The Referrals Section of this user manual outlines the tests available to users that are not performed at Our Lady of Lourdes Hospital and which are referred to external laboratories.

6.3 Tests Available to General Practitioners (GPs) & Associated Arrangements

- GP practices must ensure that all details on both samples and request forms are provided, as outlined in this User Manual, are legible. Use Printed labels and GP stamps are preferred.
- Only the tests listed below are available to GPs:

Biochemistry		Haematology	Immunology	Microbiology
Thyroid Function (Free T4/TSH)	Urate	Vitamin B12/Folate (Fasting sample)	Anti-CCP	Culture & Sensitivity
LH & FSH	Amylase		Rheumatoid Factor	Fungal Culture
Cortisol (time must be stated)	Magnesium	Infectious Mononucleosis screen	Thyroid microsomal antibodies (TPO)	Mycobacterial investigation
PSA (Supply Clinical details)	Creatinine Kinase	Coagulation screen (PT & APTT)	Tissue Transglutaminase antibody (tTg)	Stool investigation
Oestrodial	Iron studies	INR (Warfarin)	IgG/A/M Protein Electrophoresis	Ova & Parasites (based on clinical details)
Progesterone	Digoxin	ESR	Connective Tissue Disease (CTD) Screen	Chlamydia / Gonorrhoea
Prolactin	Carbenamazapine	Ferritin	Only 3 Allergy tests permitted: - Animal Disorders (allergy) - House dust mite (allergy) - Peanut Allergy - Mixed Grass pollen (allergy)	Herpes Simplex Virus
Sex Hormone Binding Globulin	Phenobarbitone	G6PD		Varicella Zoster Virus (VZV) IgG (Immune status)
Testosterone	Phenytoin	Sickle cell/ Thalassaemia		STI screen (syphilis, HIV, HBsAg)
Lithium	B-HCG	FBC & WBC Differential - *Note for patients with known platelet clumping, the platelet count can be reported on a coagulation (citrated) tube – this must be done in house not referred to Biomnis.*		Measles/Mumps/Rubella IgG screen
CA 125	Theophylline			Viral Hepatitis B & C screen (HBsAg + anti-HCV)
CA 15.3	Valproate			Hepatitis B Infection status (HBsAg, anti-HBc)
CA 19.9	C Reactive Protein (CRP)			Hepatitis A IgG (HAV IgG)
Alpha Feto-protein (AFP)	Lactate Dehydrogenase			Hepatitis B surface Antigen (HBsAg)
Carcinoembryonic Ag (CEA)	NT Pro-BNP			Hepatitis B surface Antibody (Post vaccination)
Androstenedione	Vitamin D			Hepatitis C Antibody (anti-HCV core IgG)
Lipid Profile (fasting)	Renal Profile			Hepatitis C PCR (HCV RNA; current infection)
Liver Profile	Bone Profile			Syphilis serology
Glucose (random)	Microalbumin			HIV Ag/An Combo assay
Glucose (fasting)	Protein/Creatinine Ratio			Individual serology screens (HIV, Hep B, Hep C, Hep A)
Glucose (2hr PP)	HbA1c			Individual Molecular screens (HSV PCR)

Table 4. ***Laboratory Tests available to GPs***

The following requirements and arrangements are in place relating to testing of GP/primary care samples:

- All adult Biochemistry, Haematology and Microbiology requests from GPs are forwarded to Eurofins Biomnis for testing, this includes those received on other hospital request forms.
- Samples deemed 'urgent' can be processed in the Biochemistry & Haematology Departments in Our Lady of Lourdes Hospital. Contact must be made in advance with Specimen Reception and samples put into a separate envelope marked 'urgent' so that they can be readily identified.
- All GP COAGULATION requests are performed at Our Lady of Lourdes Hospital.
- All paediatric GP requests (<16yrs of age) are to be performed at Our Lady of Lourdes Hospital regardless of the request form they are received on.
- Due to the labile nature of potassium and phosphate, these tests will not be reported by Eurofins Biomnis. Should you specifically require either of these tests, they can be processed in the Biochemistry Department in Our Lady of Lourdes Hospital. Contact must be made in advance with a Medical Scientist in the Biochemistry Department (**041 9874795**). If these samples are not going to reach the laboratory in <6hours, the patient can attend the Phlebotomy Department in Our Lady of Lourdes Hospital, preferably in the afternoon and by making an appointment on www.swiftqueue.ie. Note, a walk-in phlebotomy service is NOT available.
- Stool samples for culture and sensitivity (C&S) as well as *C. Difficile* testing will be outsourced to Eurofins Biomnis. Ova and Parasites will continue to be sent to Cherry Orchard by our Referrals Department. **A separate sample and Cherry Orchard request form must be received for this request.**
- All referral tests from GPs not within the catchment and on other hospital request forms are forwarded to their respective laboratory for processing by the referrals department.
- GP requests performed in house that are outside of our catchment area and not set up as a location in the Laboratory Information System, are logged using the EXTGP code for clinician and source, with the GP name and Surgery typed into the comment field in Request Entry on WinPath to appear in the test report.
- No GP letters are accepted in lieu of a request form
- Patients attending Our Lady of Lourdes Hospital Phlebotomy with a request form from a laboratory other than an OLOL Drogheda or OLH Navan will be turned away and re-directed to the respective hospital for phlebotomy services.
- All GP samples received after the final courier on a Friday evening are processed by Our Lady of Lourdes Hospital.
- Exceptions to these requirements are urgent requests phoned into the Our Lady of Lourdes Hospital laboratory by GPs within the Our Lady of Lourdes Hospital catchment and Oncology patients.

- Samples are collected and delivered to Our Lady of Lourdes Hospital as outlined in section **7, below.**
- Samples for Eurofins Biomnis are collected from a designated collection point in Our Lady of Lourdes Hospital, Monday to Friday at 14:30 and 16:30
- Results from Eurofins Biomnis are returned via Healthlink or a paper copy is sent via An Post should the GP opt for same

- All queries should be directed to the Client Services Department, Eurofins Biomnis through the freephone number **(1800 252 966)** or via email (client.services@eurofins-biomnis.ie)

6.4 Tests Available On-Call

- The following tests are available on-call (8pm to 8am Monday to Friday and 5pm to 9am Saturday, Sunday and Bank Holidays):

6.4.1 Haematology:

These tests are available out of hours:

- FBC & WBC Differential
- Reticulocytes
- ESR (Clinical reasons required to justify testing)
- Infectious Mononucleosis
- Urgent Blood Film review: query Acute Leukaemia / TTP
- Malaria Screen: Serology only (thick & thin film up to 10pm)
- Coagulation: PT & APTT
- Fibrinogen
- D-Dimer (Clinical reasons and Wells Score required)

6.4.2 Biochemistry:

These tests are available out of hours:

- Renal Profile (Electrolytes, Urea & Creatinine)
- Liver Profile (Protein, Albumin, Bilirubin, ALP, ALT and GGT)
- Bone Profile (Calcium & Phosphate)
- Ions (Calcium, Phosphate & Magnesium)
- CRP
- Amylase
- CK
- SBR: Total & Direct Bilirubin
- AST
- Paracetamol & Salicylates
- Serum Osmolality
- Troponin
- Urinary Osmolality & Electrolytes
- Urinary Amylase
- CSF: Glucose & Protein
- Procalcitonin
- Lactate
- Uric Acid
- Bicarbonate
- Lipid profile (cholesterol, HDL, LDL ,Triglyceride)

6.4.3 Microbiology:

These tests are available out of hours:

- Blood Cultures, send samples ASAP after collection
- Urine Microscopy (paediatrics only)
- CSF analysis
- Theatre samples / samples from sterile sites (e.g. knee aspirate)
- Covid* testing (8pm to Midnight) – ED, Ward samples with covid/influenza symptoms, ICU, NICU, Paediatrics
- Covid* testing post-midnight (Resus, ICU, NICU, Paediatrics)
- Samples from NICU/ICU/HDU (8pm to midnight)

* Note Staff testing / repeat samples will be processed **within routine hours only**

6.4.4 Blood Bank:

- Group & Hold requests: Labour Ward, Emergency sections, ICU/HDU, Emergency Dept, Emergency Theatre
- Group & Crossmatch: Emergencies only. All anaemias should be dealt with during routine hours 8am-8pm Monday – Friday and 9am-5pm Saturday, Sunday and Bank Holidays
- DCT with relevant clinical information
- Issue of Plasma, Platelets, Red Cells and other blood products as needed

All samples must be delivered to the laboratory via the chute system, with the exception of CSF & theatre samples which must be hand delivered and **medical scientist for microbiology contacted via switchboard**.

All phone calls to the laboratory from 12am to 8am should be made through switch requesting the relevant department.

At all times, add on requests should be made by sending a request form requesting that the test be added to the sample already within the laboratory.

6.5 Authorisation to Request Laboratory Tests

All laboratory requests must be made by or on behalf of an identified Hospital Consultant or General Practitioner (GP) caring for the patient, who will be contacted in the event that Critical Test Results arise.

As there are a number of requestors having similar names**, the consultant / GP <u>full name</u> must be written on the request form** so that the report is returned to the correct consultant.

See Blood Bank section for policy on permission to request tests from Blood Bank. The policy on permission to request tests from all other departments is outlined in Table 5, below.

Self-testing of staff, or testing of others known to staff, without a request complete by a Clinician, is **<u>not</u>** permitted.

Staff Position	Ward / Location	Test Request	Additional Comments Only
Consultants and NCHDs	Louth Hospital Group	All tests	
General Practitioners	OLOL Catchment Area	All in-house tests	Certain referred tests are not available to GPs
Staff Nurses / ANP / CNS	Louth Hospital Group	All tests*	
Midwives / AMP	Louth Hospital Group	All tests*	

Table 5. ***Laboratory Test Requesting Permissions (exc. Blood Bank)***

6.6 Completion of Request Forms

Completion of the Request Form in the clinical area is the first Critical Control Point in the process of ensuring a correct blood result on the correct patient is issued to the correct requestor within defined turnaround times.

The Request Form must be completed in full prior to collecting samples, and brought to the patient bedside at the time of sample collection. This is in order to perform **<u>positive patient identification</u>** between the patient/wristband, request form and samples.

The examination request (request forms & samples) must **comply with defined laboratory acceptance criteria**, as outlined in this User Manual, and provide sufficient information to ensure:
— Unequivocal traceability of the patient to the request and sample;
— Identity and contact information of requester;
— Identification of the examination(s) requested;
— Informed clinical and technical advice, and clinical interpretation can be provided.

All required information provided on Request forms must be legible.

On completing the request form, the requestor must **verify and when relevant, record** that the patient meets pre-examination requirements – for example:

- fasting status,

- medication status (time of last dose, cessation)
- sample collection at predetermined time or time intervals];

For any genetic/molecular tests, full clinical information and reason for testing, must be provided on the appropriate request form to aid in result interpretation and in identifying if any further testing would be recommended. Where required, patient consent must be provided and recorded in the patient notes.

Each request accepted by the laboratory for examination(s) is considered an agreement.

The examination request information is provided only on request forms, as listed in Section 6.11 below.

Where necessary for patient care, the laboratory communicates with users or their representatives, to clarify the user's request.

6.7 Laboratory Policy on Patients Gender on Result Reports.

It is the Laboratory Policy to report results using the patient's birth gender

It is the responsibility of the Requesting Clinician to interpret ranges as appropriate and in conjunction with the patient's clinical presentation.

6.8 Laboratory Policy on Use of Patient Titles

It is the policy of the laboratory to report test results and issue Blood/Blood without patient titles, regardless if these are provided on the request forms/samples.

6.9 Appropriate Ordering of Tests

As the service is a demand led service, due consideration should be given before requesting tests to ensure that an efficient and cost effective service is provided to all users. If in doubt about frequency of retesting, the laboratory should be contacted for advice.

6.10 Additional Testing of Primary Samples (Add-on tests)

If a specimen has been received by the Laboratory and testing of an additional parameter is required, the laboratory should be contacted to assess feasibility of using the initial specimen for analysis as age of specimen may impact on the validity of test results.

6.11 List of Current Laboratory Request Forms

It is important that the correct form is supplied for a particular test. There are a number of different request forms used for different analyses as outlined in Table 6. *Request Forms*. One request form may accompany multiple specimens.

Request Form	Requirements
LF-BB-0001 ***Blood Bank Request Form***	Blood Grouping, Antibody Screens, Cross-matching, Direct Coombs Test, Anti-D Requests and Blood Product Requests
LF-BB-0137 ***Blood Bank Request Form for Routine Antenatal Anti-D Prophylaxis***	Routine Antenatal Anti-D Prophylaxis (RAADP) – ref. Blood Bank Section 3.3.
LF-GEN-0032 ***Blood Sciences Request Form***	Haematology & Coagulation, Biochemistry & Referral Tests
LF-HIST-0055 ***Histopathology and Non Gynae Cytology Request Form***	General Test Profiles in Histology & Cytology
LF-HIST-0085 ***Placenta Histopathology Form***	Placenta Requests
LF-HIST-0075 ***Histopathology Bone Marrow Trephine Request Form***	Bone Marrow Trephine Requests
LF-MIC-0001 ***Microbiology Request Form***	Microbiology requests
LF-MIC-0059 ***Microbiology Surveillance Screening Request Form***	HCAI screen requests
LF-MIC-0060 ***SARS-CoV-2 Request Form***	Covid-19 requests
LF-BIO-0035 ***Gentamicin/Vancomycin Request Form***	Gentamicin/Vancomycin Levels
LF-HAEM-0107 ***Bone Marrow Aspirate Request Form*** *LF-HAEM-0124* ***Lupus Anticoagulant Screen Request Form***	For the use with Bone Marrow **Aspirates** only Lupus Screen requests
ED-HAEM-0069 ***Thrombophilia Screen Request Form*** *ED-HAEM-0070* ***Genetic Testing for Thrombophilia Patient Information Sheet*** *ED-HAEM-0071* ***Consent Form for Genetic Analysis (Thrombophilia Mutational Analysis)***	Thrombophilia Screen
LF-BIO-0050 ***Troponin Request Form***	Troponin Levels

Table 6. *Request Forms*

6.12 Patient Consent

Informed consent of the patient is obtained for all sample collection procedures carried out on the patient.

Special procedures, including more invasive procedures, or those with an increased risk of complications to the procedure, may need a more detailed explanation and, in some cases, recorded consent.

If obtaining consent is not possible in emergency situations, the laboratory may carry out necessary procedures, provided they are in the patient's best interest.

For any genetic/molecular tests, full clinical information and reason for testing, must be provided on the appropriate request form to aid in result interpretation and in identifying if any further testing would be recommended.

At all times, it is the responsibility of the requesting clinician to explain the nature of the tests requested to the patient. The requesting clinician is also responsible for ensuring that consent is received from the patient for testing and also for submission of relevant clinical information and family history if required.

6.13 Sample Acceptance/Rejection Policy

It is important for users to have a clear knowledge of the laboratory Sample Acceptance/Rejection Policy, to ensure that samples received are acceptable for processing.

Sample Rejection Policies exclusions are in place for precious/irreplaceable primary specimens, as per relevant sections of this User Manual.

Samples that do not meet acceptance criteria cannot be processed and will be discarded.

In order for a sample to be accepted for processing, the sample(s) and form (s) must meet the acceptance criteria outlined in this User Manual, as per Table 7 below. See Blood Bank section for the full policy on sample acceptance for the Blood Bank.

For General Practitioner (GP) requests, the use of the Medical Practice Stamp on the request form is preferred.

For In-Patients, the use for PDA labels is the preferred option for labelling samples.

Addressograph labels are NOT accepted on any Blood Samples. This is because these large labels causing blockages on analysers and obstructing checks of sample fill level, sample quality and tube expiry dates.

Specimen	Request Form	Specimen or Request Form
• Full Name (No abbreviations) • DOB **and** MRN for all Blood Bank requests. • Date of Birth and / or MRN for non-Blood Bank requests	• Full Name (no abbreviations) • DOB **and** MRN for all Blood Bank requests. • Date of Birth and / or MRN for non-Blood Bank requests • Requesting Clinician (Consultant/GP) • Test(s) requested	• Date of specimen collection • Time of specimen collection • Source • Identity of Sample taker for all Blood Bank requests.

Table 7. Sample Acceptance Criteria

All of the above information **MUST:**

- be supplied
- be identical if present on both the specimen and request form
- be legible

Samples are rejected in the following circumstances

- Do not meet the Sample Labelling Acceptance Criteria
- Leaking specimens
- Incorrect/Insufficient specimen for test requested
- Specimen tube out of date
- Blood samples labelled with Addressograph labels.

6.14 3-Step Process for Correct Identification of Patients, Blood Samples and Request Forms

- Please ensure to follow this processes at all times when collecting blood samples **to ensure patient safety** by avoiding discards of mislabelled samples and Wrong Blood In Tube (WBIT) which cannot always be detected by routine laboratory checks.
- Detected deviations from this process will result in samples being rejected. All detected incidents of WBIT will be reported in Hospital and Laboratory Quality Management Systems.

1. BRING COMPLETED REQUEST FORM, REQUIRED TUBES, YOUR OWN ID SWIPE CARD, PDA, PDA PRINTER & Equipment (Tray, Tourniquet, Needle, Dressing, Sharps Bin) TO PATIENT BEDSIDE

- Complete ALL required information on the form (Addressograph with Full Name, MRN & Date of Birth; Required tests; Requestor; Location; Fasting status; Clinical details)
- Use Addressograph labels on ALL COPIES of the Request Form
- Complete request form in pen, ensuring that all details are LEGIBLE
- Ensure to include bleep no & consultant to expedite communication of critical results.
- Bring the request form, required tubes & equipment, including PDA and PDA Printer, to patient bedside
- Set up PDA and PDA Printer so that it is ready to use.

2. POSITIVELY IDENTIFY THE PATIENT

- Check that details on Request Form and ID Wristband match:
  a. MRN
  b. FULL NAME
  c. DATE OF BIRTH
- **Get patient to confirm their Name and Date of Birth** & **ensure this matches details on Request Form**. If <16/unconscious/not *compos mentis*, parent, guardian or nurse must confirm details
- Resolve any discrepancies before sampling.

3. COLLECT SAMPLES & LABEL THEM IN THE PRESENCE OF PATIENT, AFTER COLLECTION

- Using correct venepuncture procedures, collect blood samples* into the appropriate **unlabelled** tubes, using correct Order of Draw:

Green -> **B**rown -> **O**range -> **R**ed -> **Y**ellow -> **V**BG
Good -> Blood -> Order -> Requires -> Your -> Vigilance

- Use PDAs for all sample labelling AFTER sample collection, in the presence of the patient, as follows:
  1. Scan Own ID Badge
  2. Scan Patient ID Wristband
  3. Scan Printer & Print Labels
  4. Label Sample(s) and Request Form (s) with PDA labels
  5. Discard any extra labels
- The patient identification must only be obtained at the patient bedside **from the wristband on the patient's arm, never the intended patient's chart.**

6.15 Specimen Collection & Order of Draw

It is the responsibility of the person taking the sample (i.e. doctor, nurse, phlebotomist, CHI @ Crumlin Shared Care Sample Taker) to ensure the laboratory is provided with complete and accurate patient identification details on **both** the **sample request form** and **specimen container.**

Before proceeding to collect samples, it is the responsibility of the person taking the sample to:

- Ensure the Request Form is completed fully with all required patient identifiers (Name, MRN, DOB) and information (requestor, location, tests, fasting/medication status, special timing intervals) - ref. Section **6.6**, above
- Ensure that all appropriate sterile equipment is within date and all packaging is intact.
- Bring the following items to the patient bedside
    - Completed Request Form
    - All required sample tubes;
    - All required sample collection equipment, e.g. needles, dressings, tourniquet, alcohol wipes, sharps bin and tray,
    - Own Swipe/ID
    - PDA & PDA printer
- Explain the procedure and rationale to the patient answering any questions, thus ensuring an informed verbal consent is obtained.
- Perform positive patient identification (patient details on form v patient/wristband), and resolve any discrepancies before proceeding– ref. Section **6.14**, above
- Confirm that patient is fasting, if required.
- Arrange sample tubes to ensure that Blood Samples will be taken in the correct Order of Draw – ref Table **8**, below.

During sample collection, it is the responsibility of the person taking the sample to:

- Ensure to use the technique for Blood Sample Collection is outlined in Phlebotomy Section, below.
- Take samples into the appropriate specimen containers for the test(s) required – ref. relevant departmental section of this User Manual
- Ensure that sufficient specimens are collected (check with laboratory if in doubt)

After sample collection, it is the responsibility of the person taking the sample to:

- Dispose of all needles directly into sharps bins when finished sampling - in line with current Waste Management procedures – ref. Posters Displayed in Clinical Areas.
- Dispose of all contaminated material into biohazard bins, in line with current Waste Management procedures – ref. Posters Displayed in Clinical Areas.
- Label the specimen containers, **in the presence of the patient,** with all required identifiers and information, preferably using PDA for in-patients and printed labels for primary care – ref. Section **6.14**, above.
- Place samples in biohazard bag attached to form (excl. histology) and send to the laboratory for processing without delay – ref. Section **7**, below

IT IS NOT ACCEPTABLE TO DRAW BLOOD SAMPLES AND RETAIN THEM IN THE CLINICAL AREA FOR LATER COMPLETION OF REQUEST FORMS AND SENDING TO THE LABORATORY. THIS PRACTICE IS ASSOCIATED WITH SIGNIFICANT PATIENT SAFETY RISKS.

As additives present in specimen bottles may cause problems if carried over from one type of container to another, it is important to fill the containers in the correct order as outlined in Table 8. *Order of Draw of Blood Tests*.

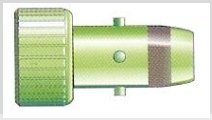
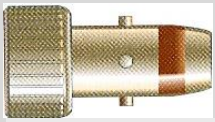
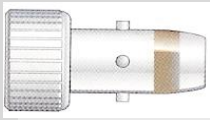
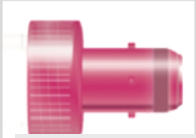
Tube	Tests	Additive	Order of Draw
 COAGULATION	**Haematology** ** **Sample must be filled to line on tube** ** PT/INR 2.7ml Adult APTT 1.2ml Paediatric D-Dimer Fibrinogen	Sodium Citrate	1
 SERUM GEL	**Biochemistry** General chemistry 2.6ml Adult Endocrinology Therapeutic Drugs Antibiotic Levels	Clot activator & Gel	2
 SERUM	**Biochemistry** Paediatric General Chemistry 1.1ml Paediatric Paediatric Endocrinology 2.6ml Adult Antibiotic Levels Drug Levels	Clot activator	3
 LITHIUM	**Biochemistry** Troponin I 2.7ml Adult Ammonia 1.2ml Paediatric Paediatric General Chemistry	Lithium Heparin	4
 EDTA (BLOOD TRANSFUSION)	**Blood Bank** Group & Screen 7.5ml Cord Crossmatch, Antibody Identification; 4.5ml / 4.9 ml Adult Phenotype, Direct Coombs 2.7ml Paediatric Anti-D Quantitation; Anti-c Quantitation	EDTA	5
 EDTA	**Biochemistry** HbA1C ESR 2.7ml Adult 1.2ml Paediatric **Haematology** FBC, ESR, Retics, Infectious Mononucleosis Sickledex, FMH estimation Malaria	EDTA	6
 ThromboExact EDTA	**Haematology** Platelet Count only – tube available from lab on request	Mg2+ EDTA	7
 SODIUM FLOURIDE	**Biochemistry** 2.7ml Adult Glucose 1.2ml Paediatric Lactate	Fluoride EDTA	8

Table 8. ***Order of Draw***

7. DELIVERY, PACKING & TRANSPORT REQUIREMENTS FOR SAMPLES

7.1 General Information

It is the policy of the laboratory to treat all specimens as potentially infectious. Therefore, it is advisable to take universal precautions in the collection, packaging and the delivery of specimens being sent to the Laboratory for analysis.

Samples should be sent to the Laboratory as soon as possible to avoid specimen deterioration with subsequent inaccurate and possibly misleading results.

Specimens should be placed in the correct container and placed in the sealable transport bag attached to the relevant request form as soon as the specimen has been taken.

7.2 Sample Delivery from within the Hospital

Samples are delivered to the laboratory either by hospital personnel or via the Pneumatic Chute System.

For hand-delivered samples, **urgent or in-patient samples should NOT be left in the post box outside the laboratory**, Ensure that such samples, if not sent in the Chute, are hand-delivered into the laboratory (ref. *LI-GEN-0072 Laboratory Corridor Notice - Urgent Samples).*

The pneumatic chute system is used to transport samples from various destinations around the hospital to the Department of Pathology. All current blood collection tubes are suitable for transport in the chute system.

The following sample types are **never** to be sent via the tube system:

- Any containers containing over 100ml fluid
- Arterial blood gas samples
- CSF samples
- Histology or Cytology samples
- Blood Components or Products

All specimens are sealed in the bag attached to the request form before loading into the pneumatic tube canister.

Operating Instructions:

1. Place specimens to be transported into the canister provided.
2. Dial the destination address. (2102 for laboratory)
3. Enter the canister into the pneumatic chute.

Please contact the maintenance department, if there are any problems with the chute system.

7.3 Sample Delivery from External Sources

Primary care or out-patient samples, that are not urgent and which do not have special / time-dependent requirements for processing, can be left in the post box outside the laboratory. Any queries in relation to this can be made to specimen reception staff, by ringing the doorbell, or by phone call.

All samples transported by road must comply with the ADR transport regulations and be packaged as per ADR P650 Packing Instruction. ADR compliant packaging is provided by the Department of Pathology or the Primary Care Service. It is the responsibility of the sender to ensure that specimens are transported and packed in accordance with these regulations. Advice may be obtained from the Laboratory.

All samples originating from Louth County Hospital are brought to Room 5 for collection. All samples with the exception of Colposcopy and Histology samples are placed in the designated fridge. GP samples are placed in the post box opposite the main outer entrance to the Minor Injuries Unit. The contents of this box are collected and brought to Room 5 on a regular basis for onward delivery to Our Lady of Lourdes Hospital.

Samples are routinely collected from Room 5 in Louth County Hospital (Monday- Friday) at the following times:

08:00 hours	**13.00 hours**	**16:00 hours**

The Warfarin Clinic is held on Monday, Tuesday and Thursday mornings and on each of these days there are two additional collection times of 09:00 and 11:00 hours.
If any samples need to be delivered From LCH to the Laboratory outside the routine collection, a taxi will be arranged by Nursing Administration who retains the appropriate packaging and instructions for same. Cu Chulainn Blood Bikes service is also available for transport of these samples out of hours.

From 1st July 2024, patients attending the Warfarin Clinic at Our Lady of Lourdes Hospital will have samples taken in the phlebotomy clinic. Samples will be expedited to the laboratory for processing and uploading to RAID for dosing.
Table 9. *Sample Collection Days by Primary Care* outlines the days of collection from external locations. Please contact Primary Care for any issues relating to collections.

Kingscourt/Ardee/Carrickmacross Areas	**Tuesday & Thursday**
Dundalk Area	***Monday & Wednesday***
Drogheda Area	***Monday/Tuesday/Wednesday/Thursday***

Table 9. *Sample Collection Days by Primary Care*

8. REPORTING OF RESULTS

At all times, it is the responsibility of the requesting Clinician to follow up on requested laboratory tests. Critical results will be communicated to clinicians as described in this User Manual.

At all times, staff are only permitted to review results relating to patients in their clinical care at Our Lady of Lourdes Hospital.

8.1 Test Report Contents

Test reports issued by our Lady of Lourdes Hospital Drogheda contain the following elements:

- unique patient identification (MRN, Surname, Forename and Address of patient, Gender, Date of Birth, LIS Accession Number), the date of primary sample collection and the date of the issue of the report, on each page of the report;
- identification of the laboratory issuing the report - the Department of Pathology i.e. Our Lady of Lourdes Hospital, including where possible, the identity of the Department i.e. Blood Bank, Haematology;
- name or other unique identifier of the user - Requesting Clinician & Source
- type of primary sample and any specific information necessary to describe the sample (e.g. source, site of specimen, macroscopic description);
- clear, unambiguous identification of the examinations performed - The test carried out e.g. Blood Group, Antibody Screen, ESR, FBC
- identification of the examination method used, where relevant, including, where possible and necessary, harmonized (electronic) identification of the measurand and measurement principle;
- examination results with, where appropriate, the units of measurement, reported in SI units, units traceable to SI units, or other applicable units;
- Biological reference intervals, clinical decision limits, likelihood ratios or diagrams/nomograms supporting clinical decision limits as necessary - Reference ranges for test attributes are documented on all reports, and contained in this manual.
- Identification of examinations undertaken as part of a research or development programme and for which no specific claims on measurement performance are available – this does not apply to testing at Our Lady of Lourdes Hospital.
- Identification of the Medical Scientist/Consultant reviewing the results and authorizing the release of the report (if not contained in the report, readily available when needed).
- Identification of any results that need to be considered as preliminary – interim reports
- Indications of any critical results, where possible.
- unique identification that all its components are recognized as a portion of a complete report and a clear identification of the end (e.g. page number to total number of pages) - Page number to total number of pages e.g. page 1 of 2
- All available information necessary for the interpretation of the results:
    - If applicable, free text or predefined laboratory comments to document information relevant to the test e.g. “Issued as least incompatible”.

- If applicable, free text or predefined laboratory comments to document any factors which may have impacted on the accuracy of the result e.g. haemolysis.
- When applicable, reports include interpretation of results and comments on:
    1. Sample quality and suitability that can compromise the clinical value of examination results;
    2. Discrepancies when examinations are performed by different procedures (e.g. POCT) or in different locations;
    3. Possible risk of misinterpretation when different units of measurement are in use regionally or nationally;
    4. Result trends or significant changes over time
- When necessary for patient care, the time of primary sample collection is included.
- Time of report release, if not contained in the report, is readily available when needed.
- Identification of all examinations or parts of examinations performed by a referral laboratory, including information provided by consultants, without alteration, as well as the name of the laboratory performing the examinations.

8.2 Access to results within Our Lady of Lourdes Hospital & Louth County Hospital

Results for all tests processed in Our Lady of Lourdes Hospital are available for look-up on Ward Enquiry within thirty minutes of authorization. Staff who require access to results will be given individual log-on passwords.

Results from referral laboratories are available in different formats depending on the location of the referral laboratory e.g. hard copy, MediBRIDGE and Eurofins Biomnis website.

The instructions for accessing results on Ward Enquiry via Citrix Store Front on Hospital PCs are as follows:

1 Introduction

- Note: All users of WinPath Ward Enquiry must comply with relevant HSE GDPR Data Protection policies and access only results relevant to patients in their clinical care.
- Passwords to WinPath Ward Enquiry should be changed regularly and users must log out of the system when finished using it.
- Always check WinPath Ward Enquiry prior to contacting the laboratory by telephone.

2 **Access to WinPath Ward Enquiry**

- For access to WinPath Ward Enquiry, clinical users must submit *LF-IT-0002 WinPath Ward Enquiry User Account Request Form* (available on Q-Pulse) to the system administrator (Laboratory IT Manager Ronan.Dauria@hse.ie)

3 Logging On

- Double click on WinPath WardEnq icon on the Citrix Storefront
- Enter your logon ID and password
- Press enter or click OK

- You are now in the search screen

4 Searching for Records

- Type in the required criteria into the search fields
- Click Start. To stop a search before completion, click STOP. Clicking New Search will clear the fields for a new search to be performed.
- Any matching results will be displayed on the Search List grid. If your search criteria is too wide this can potentially display the results for many patients
- Click on the result row required, details are displayed in the bottom section of the screen.
- Double click on the row to view results, or click once and then click the results button
- The results will appear in the main body of the screen, above this is the laboratory number and the patient demographic details. Always ensure that the patient demographic details match the patient you are searching for.
- Please Note: The key to retrieving fast and accurate data is to enter as much information about the patient as possible. This application is event based which means that it will return multiple records for the same patient if they exist.

5 If patient or result required are not found:

- Remove MRN, enter patients name and date of birth.
- Check if the start and end date of the search is appropriate and change if necessary.
- Click on start to reinitiate the search.

6 Logging Off

- To Log off, click the Logoff button or select File > Logoff

8.3 Access to results by GP's, Community Hospitals, Nursing Homes

Reports destined for locations outside the hospital are delivered by a Primary Care Courier or sent via An Post. They are also available via Healthlink to participating locations. Details on Healthlink can be obtained from the Healthlink website: http://www.healthlink.ie/ or by telephone on 01-8825606.

8.4 Copy Reports

As copy reports cannot be effectively handled by Healthlink via the WinPath Laboratory Information System, extra samples and separate request form are needed for all GP add-ons.

For in-house or out-patient requests, the onus is on the requestor to provide a copy of any results to GPs.

All requests for copy reports should be sent to pathology.olol@hse.ie.

8.5 Reports by Telephone

It is preferable not to give any laboratory results over the telephone. However, if results are at a critical level or a delay in receiving the results would cause a delay in treatment, then every effort will be made by the departments to contact the requesting clinician/GP. A record of telephoned results is held by the laboratory on Winpath and includes the identity and title of the person to whom the result was conveyed, the contact details and the parameter(s) reported. Results can only be communicated to the responsible clinician and cannot be communicated by laboratory staff to patients. GP's must not instruct patients to ring the laboratory for their results.

8.6 Reports by Fax

As per the *HSE Electronic Communications Policy,* due to the confidential nature of reports and the personal details they contain, reports are not faxed unless a delay in communicating the results would cause harm to the patient or result in treatment being delayed. Where a faxed report has been requested, it can be issued to a “designated person” at a “designated fax machine” at the requesting location only. The Laboratory will require confirmation of receipt of the faxed reports.

8.7 Information on of Measurement Uncertainty (MU)

It is the laboratory policy to provide information on Measurement Uncertainty (MU) to laboratory users on request, by emailing JoanneM.Duffy@hse.ie.

MU 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 specific property of the analyte being measured (e.g. mass of a substance or its biological activity). By quantifying the possible spread of measurements, an estimate of confidence in the result may be obtained.

MU is a core element of the quality system for all methodologies in medical laboratories that produce a numerical result. For non-numerical results, alternative approaches to evaluating uncertainty are in place.

Although there are many factors in both the pre- and post-analytical phases of laboratory process, as well as biological variation, that may create uncertainty in the final result, because these factors do not affect the inherent uncertainty of the measurement procedure itself, they are excluded from the estimation of MU. Despite this, such pre- and post-analytical factors are identified and minimised (or where possible eliminated) as part of the quality management system.

8.8 Laboratory Errors and Open Disclosure

All laboratory errors are reported as non-conformances in the Quality Management System to effectively address the issue, identify the root cause, put measures in place to avert recurrence of the error and assess the extent and clinical impact of the issue. Where it is

identified that there is medical significance for any patient(s) of the Louth Hospital Group, these errors are reported in the national incident management system.

Open disclosure related to laboratory incidents is handled by patient's consultant in conjunction with the hospital Quality and Patient Safety department and relevant laboratory consultant, in compliance with relevant HSE procedures.

10. SPECIMEN RETENTION

All specimens tested in the laboratory are retained for a minimum of 72 hours.

All Blood Bank samples are retained for 14 days

The following laboratory policies which contain full details on the retention of specimens is available on request from the Laboratory Manager:

- *QP-GEN-0023 Procedure for the Control of Archive Documentation, Specimens and Preparations*
- *AP-AS-0005 Retention, Storage & Disposal of Clinical Material arising from Post-mortems*

11. DATA PROTECTION & CONFIDENTIALITY

Confidentiality of patient information is maintained by all laboratory personnel as per contracts of employment and job descriptions and staff are compliant with GDPR regulations.

At all times, data is processed by the laboratory in line with *ED-GEN-0355 RCSI Privacy Statement / Fair Processing Notice*, as displayed at the main hospital entrance.

PHLEBOTOMY

1. PHLEBOTOMY INTRODUCTION

The importance of collecting an appropriate sample from the correct patient cannot be over emphasised. The work of the phlebotomist involves the collection of blood using aseptic techniques and strictly adhering to standard precautions as history of infectivity of the patient may be unknown. The Sarstedt Vacutainer System is used for drawing blood from patients.

2. GENERAL INFORMATION

2.1 General Precautions

PP-PHLEB-0001 Phlebotomy Procedures is a detailed guide on the collection of blood samples.

- Standard Precautions must be observed when taking blood.
- Disposable non-sterile gloves must be worn when taking blood and changed between patients.
- Hands are washed or an antimicrobial gel is applied before and after each procedure and on removal of gloves.
- Extreme care must be taken and every patient considered as potentially high risk.
- All cuts and abrasions are covered with a water-proof dressing.
- Protective eye-ware (goggles) should be worn if deemed necessary.
- Needles should not be re-sheathed.
- Dispose of all sharps in a sharps container.
- All specimens and samples are treated as potentially infectious or high risk therefore blood stained or leaking samples cannot be accepted by any department.
- User is responsible for the safe and appropriate use and disposal of sharps.
- Care is needed to prevent needle stick injury.
- Resolution of a discrepancy of patient ID at the bedside should be noted on the request form as a merge of laboratory records may be required.

2.2 Storage of Material for Blood Collection

Sarstedt Safety Needles and Sarstedt S-Monovette Blood Collection System should be stored at room temperature. Always ensure that the blood tubes have not exceeded their expiry date.

2.3 Procedure for Collection of Blood

The individual who takes the blood must label the specimen(s) <u>in the presence of the patient.</u>

Details on the collection of blood samples are in *PP-PHLEB-0001 Phlebotomy Practices* available on the Hospital Q-Pulse.

2.4 Special Precautions for In-Patients

- Do not make more than two attempts to draw blood. Use a new sterile needle on each attempt. In the event that two attempts have been unsuccessful on the wards, inform the clinical nurse manager and return the request form.
- Do not draw blood from in-dwelling lines or cannula.
- Do not draw blood from an arm with an infusion in progress. When infusions are in place on both arms ask staff if one can be switched off for 3 minutes minimum to allow for venepuncture to take place. Advise staff when procedure has been completed.
- Do not perform venepuncture on a limb which is paralysed or on a limb with evidence of oedema or where surgery on auxiliary lymph nodes has taken place. Do not perform venepuncture on an arm with a renal fistula.

2.5 Positive Patient and Specimen Identification for Unknown Patients

To ensure Positive Patient and Specimen Identification for Unknown Patients, the following details must be in the standard format and provided on an official hospital addressograph label:

- ***Surname*** - type 'unknown'
- ***First Name*** - type 'OLOL A, OLOL B etc.' from allocated Unknown Patient Folder
- ***DOB*** - type '11/11/1899'
- ***Gender/Sex –*** type 'male or female'
- ***Address –*** specify in the address field if the unknown person has been involved in a *trauma or RTA*. Use the location of the incident to form the address e.g. **Trauma** Main Street Navan Co Meath

2.6 Positive Patient and Specimen Identification for Neonates & Multiple Births

To ensure Positive Patient and Specimen Identification for neonates and in multiple births, names must be in the standard format ("Baby" "Boy/Girl" "1/2/3", e.g. Campbell, Baby Boy 3), and provided on an official hospital addressograph label:

- Medical Record Number
- Surname
- First Name e.g. Baby Boy 3
- Date of Birth
- Address
- Gender

2.7 Blood Cultures

- Use sterile techniques when taking blood cultures.

- Take blood cultures first in the order of draw before other blood samples.

2.8 Haemolysed Samples

Factors in performing venepuncture, which may account for haemolysis includes:

- Using a small gauge needle and a large tube.
- Vigorous shaking or mixing.
- Failure to allow alcohol to dry.
- Very slow flow into the collection tube.
- Drawing blood from in-dwelling line.
- Incorrect use of tourniquet
- Drawing blood from a bruised area.

2.9 Action to be taken if Patient Problems are encountered

- If an artery is entered accidentally, remove the needle immediately and apply pressure to the site. Seek nursing/medical assistance.
- If venepuncture site continues to bleed after three minutes, apply pressure to the site. Seek nursing/medical assistance.
- If patient feels weak and is sitting, loosen tight clothing and provide reassurance.
- If patient does not respond, seek nursing/medical assistance.
- Never draw blood from a patient who is standing. A standing patient is more likely to faint than a patient who is sitting or lying down.
- If the patient becomes nauseous, provide reassurance, make patient comfortable and instruct patient to breathe deeply and slowly.
- If patient develops convulsions, prevent patient from injuring himself/herself.
- If the patient objects to tests do not argue with the patient but emphasise the tests were requested by the doctor.
- **Do not proceed without the consent of the patient.**

2.10 Booking an out-patient phlebotomy appointment

1. Go to **www.swiftqueue.com**
2. Click on **Book an Appointment**
3. Enter Location **Drogheda**
4. Enter Speciality **Adult Blood Test / Children's Blood Test**
5. Select **OLOL OPD Bloods / OLOL GP Bloods**
6. Click **Book an appointment**
7. Select your appointment reason **Blood Test /Cancel Appointment**
8. Choose a **Date** and **Time** (GP patients afternoons only)
9. Click **Next** to go to **Patient Login**
10. Select **New User? Register here** (if first time user) or **Existing User login** (if you have registered previously) and follow instructions
11. Click **Confirm Your Appointment**
12. You will receive confirmation of your appointment via email

BLOOD BANK

1. BLOOD BANK INTRODUCTION

The Blood Bank Department comprises of the Blood Transfusion Laboratory and all Haemovigilance and Traceability activities. The Blood Bank provides Blood Transfusion service to Our Lady of Lourdes Hospital and Louth County Hospital. Blood Group and Rhesus Types are processed. Antibodies are identified and phenotyping is carried out if necessary. Blood is stored and subjected to stringent compatibility testing and standard procedures ensure full traceability.

Between 8.00pm and 8.00am, the Out of Hours Medical Scientist must be informed for each Blood Bank test required. The Out of Hours Blood Bank Medical Scientist can be contacted via switch (by dialling "0").

2. GENERAL INFORMATION

2.1 Services associated with the Blood Bank

SERVICE	DESCRIPTION
Blood Transfusion Laboratory **Ext 2559** **Ext 2050 Emergency Only**	The Blood Transfusion Laboratory offers a comprehensive laboratory service, for service users within Our Lady of Lourdes Hospital and Louth County Hospital including: • ABO & Rh D Grouping and Antibody Screening • Antibody Identification • Cross-matched Blood • Direct Antiglobin Test • Phenotyping (if appropriate) • Transfusion Reaction Investigation (if indicated) • Provision of Blood Components i.e. SD-Plasma & Platelets Provision of Coagulation Factors
Haemovigilance Service	The Haemovigilance Service is responsible for ensuring that 'the right patient gets the right blood at the right time' and associated haemovigilance related issues across both sites, OLOL and LCH. The Haemovigilance Officers may be contacted via bleep #257.
Phlebotomy Service	The Phlebotomy Department is responsible for taking blood samples for diagnostic testing. The Senior Phlebotomist may be contacted at #2182.
Consultant Service	The Consultant Haematologists, Dr Mary McCloy may be contacted at #5248 & Dr Barry MacDonagh at #2086 when information is required on relevant clinical issues.

Table 10. ***Services associated with the Blood Bank***

3. BLOOD BANK TEST REQUESTS & REQUIREMENTS AND CRITICAL RESULT NOTIFICATION

3.1 Requests for Blood Bank Tests or Blood Products

Requests for Blood Bank Tests or Blood Products must be made by a Clinician. Exceptions are as follows:

Staff Position	Ward Location	Test Request/Product	Additional Comments Only
Midwives	Labour Ward	Cord Group & DCT	
	Midwifery Led Unit		
Staff Nurses	Paediatric Day Ward	Group & Antibody Screen	Oncology Patients Only
Midwives	ANC	Group & Antibody Screen	
	Midwifery Led Unit		
AMP	Louth Hospital Group	Prescribe and order Anti-D Ig only	
ANP	NICU	Group & DCT	
Specific Departmental Nurses	Oncology/Haematology	RCC & Platelets	Patients with Transfusion Standing Order only
Pre assessment nurses	Pre-assessment	Group & Antibody Screen only	
Physician Assistant	Louth Hospital Group	Group & Antibody Screen only	Cannot prescribe blood products

Table 11. ***Blood Product Requesting Exceptions***

Urgent requests for Blood Bank testing should be communicated to the Blood Bank by telephone, in advance of receipt where possible to ensure immediate processing. In addition, such requests may be brought to the Blood Bank and handed to a member of staff to ensure that samples are acceptable for processing.

3.2 Critical Result Notification

The following critical results should all be phoned:

- Clinically significant antibodies detected in pregnancy
- Anti-D quantitation results phones from the IBTS
- Anti-c quantitation results phones from the IBTS
- Significant rise in antibody titre in pregnancy
- Any factor that may impact the provision of blood/products for a scheduled procedure/request e.g. positive antibody screen, blood grouping anomaly, potential delay in obtaining a suitable compatible product.
- All requests that do not meet the minimum acceptance criteria and must be discarded.

3.3 Requirements for Blood Bank Testing

TEST/PROFILE	SAMPLE/TEST REQUIREMENTS
Baby Blood Group (Patients less than 4 months old)	Request form for "Blood Group" **1.6ml EDTA** sample
Blood Group & Antibody Screen (Patients >4 months old)	Request form for "Blood Group and Antibody Screen" (signed) and **4.5 ml / 4.9 ml EDTA** sample for adults or paediatrics
Cord Blood Group	Request form for "Blood Group". **7.5ml EDTA** sample
Crossmatch of Red Cell Concentrate (Adult)	Request form for "Blood Group and Antibody Screen" and required volume/units of RCC and **4.5 ml / 4.9 ml EDTA** sample ***or*** Sample for "Blood Group and Antibody Screen" from within sample validity period *and* new Request Form required stating volume/units of RCC and reason for transfusion. ***NOTE:*** ***1. The Maximum Surgical Blood Ordering Schedule (HI-BB-0040) must be complied with for all surgical orders for RCC.*** ***2. 2nd sample / historical group required prior to issue of red cells.*** ***3. Contact the Clinical Haematology Team to ensure clinical validity of requests, if required.***
Crossmatch of Paedipack (Patients <4 months)	Request Form with Baby Details ***and*** New **Neonatal 1.6 ml EDTA** sample if no historic Baby/Cord Blood Group ***and*** New **Maternal 4.5 ml / 4.9ml EDTA** sample and Request Form for "Blood Group and Antibody Screen" if historic maternal sample for "Blood Group and Antibody Screen" > than 72 hours old. **2nd sample/historical group required prior to issue of red cells.** ***Contact the Clinical Haematology Team to ensure clinical validity of requests, if required.***
Direct Coombs Test (DCT / DAT)	Request form for "Direct Coombs Test" (DCT/DAT) and **1.6/2.7/4.5 ml / 4.9 ml or Cord EDTA** sample. ***Or*** Sample for "Blood Group" or "Blood Group and Antibody Screen" from within past 48 hours *and* new Request Form for "Direct Coombs Test".
Investigation of Suspected Transfusion Reaction	Request form for "Investigation of Suspected Transfusion Reaction" and **4.5ml / 4.9 ml EDTA** Post-transfusion samples. Contact the Clinical Haematology Team for advice as required. ***Note: All suspected transfusion reactions must be reported to the Haemovigilance Officer.***
Issue of Anti D Immunoglobulin	Request form for "Blood Group and Antibody Screen" and required dose of Immunoglobulin Anti-D and **4.5ml / 4.9 ml EDTA** sample ***or*** Sample for "Blood Group and Antibody Screen" from within past 7 days & new Request Form for required dose of Anti-D. **Note: *2nd sample / historical group required prior to issue of anti-D Ig.*** ***For RAADP, request form LF-BB-0137 is submitted weekly with all RAADP requests for that week. These requests may be issued provided that the patient has 2 previous samples on file, at least one of which is from the current pregnancy. A group & hold is then sent to the Blood Bank pre-***

	administration of the Anti-D Ig to be processed ASAP.
TEST/PROFILE	**SAMPLE/TEST REQUIREMENTS**
Issue of Solvent Detergent (SD) Plasma (LG Octaplas)	Request form for "Blood Group and Antibody Screen" and required volume/units of SD Plasma and **4.5 ml / 4.9 ml EDTA** sample ***or*** Historic "Blood Group and Antibody Screen" and new Request Form for required volume/ units of SD Plasma. **Note: *2nd sample /historical group required prior to issue of SD plasma. Contact the Clinical Haematology Team to ensure clinical validity of requests for SD Plasma, if required.***
Issue of Platelets	Request form for "Blood Group and Antibody Screen" and required volume/units of Platelets and **4.5 ml / 4.9 ml EDTA** sample ***or*** Historic "Blood Group and Antibody Screen" and new Request Form for required volume/units of Platelets **Note: *2nd sample / historical group required prior to issue of Platelets. Contact the Haematology Team to ensure clinical validity of requests for Platelets, if required.***
Issue of Factor Concentrates (Factor VIII, Factor IX, OCTAPLEX, Riastap)	Request form for required volume/units of the Factor Concentrate required. ***Contact the Haematology Team to ensure validity of requests for Factor Concentrate, if required.***
Antibody Titration **Referred by Blood Bank**	Test initiated by Blood Bank on specimen received for Blood Group and Antibody Screen. Additional **4.5 ml / 4.9 ml EDTA** sample(s) and request form requested by the Blood Bank as needed.
Anti D Quantitation **Referred by Blood Bank**	Test initiated by Blood Bank on specimen for Blood Group and Antibody Screen. Additional **4.5 ml / 4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.
Anti C Quantitation **Referred by Blood Bank**	Test initiated by Blood Bank on specimen for Blood Group and Antibody Screen. Additional **4.5 ml / 4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.
Weak D Genotyping **Referred by Blood Bank**	Test initiated by Blood Bank on specimen for Blood Group and Antibody Screen. Additional **4.5 ml / 4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.
Extended RBC Genotyping RHD/RHCE Genotyping-	Test initiated by Blood Bank on specimen for Blood Group and Antibody Screen. Additional **4.5 ml / 4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.

Table 12. ***Requirements for Blood Banking Testing***

NB: SPECIMENS & REQUEST FORMS MUST BE COMPLETED AS OUTLINED IN THIS DOCUMENT. WHERE THESE REQUIREMENTS ARE NOT MET, THE REQUEST MUST BE DISCARDED IN LINE WITH BLOOD BANK REGULATORY REQUIREMENTS.
THE MISSING DETAILS MAY BE HANDWRITTEN ON THE PDA LABELS FOR PATIENTS WITH NAMES TOO LONG FOR THE LIMITED SPACE ALLOWED BY THE EBTS PDA LABELLING. ALTERNATIVELY THESE SAMPLES MAY BE HANDWRITTEN

3.4 Out of Hours Tests in Blood Bank

Table 13. *Out of Hours Tests in the Blood Bank* outlines the tests which **are routinely** performed on call, following a phone call from the requesting doctor. The urgency of the

request, and the turnaround time should be agreed by telephone with the Out of Hours Medical Scientist.

Out of Hours Tests
Group & Hold
Group & Cross-match
Issue of Plasma, Platelets, Anti-D or Factor Concentrates
Antibody Investigation
Direct Coombs Test
Transfusion Reaction Investigation

Table 13. ***Out of Hours Tests in the Blood Bank***

4 TURNAROUND TIMES

4.1 General Turnaround Times

Test/Profile	Turnaround Time
Group & Screen	1. Routine- Same Day 2. Urgent- 60 minutes 3. Emergency- 45 minutes
Antenatal Group and Antibody Screen	≤72 hours
Compatibility Test*	Available for Day Required
Antibody Investigation	Dependent on antibody complexity – see table 15
Transfusion Reaction Investigation (serology)	2 hours
Direct Antibody Test	Same Day
Turnaround times may vary in the following situations *1. Requests outside routine hours* *2. Irregular or multiple antibodies detected and if the patient has specific blood requirements*	

Table 14. ***Turnaround Times during Routine Hours***

To ensure that an urgent request is processed immediately upon receipt, the urgency must be communicated to the Blood Bank by telephone.

4.2 Blood /Blood Product Availability

Product	Estimated Turnaround Time Note: *2nd sample / historical group required prior to issue of blood and blood components*
Red cell Concentrate	45-60 minutes if valid Group & Screen available
SD Plasma (LG Octaplas,)	30-40 minutes (if valid group & screen available)
Platelets**	1-3 hours (depends on transport time of delivery from NBC)
Factor Concentrates	10 minutes
Anti-D	1-4 hours

Table 15. ***Blood/Blood Product Availability***

4.3 Test Performed in External Laboratories

Product	Turnaround Time
Antibody Investigation	*ED BB- 0165 User Guide for the Red Cell Immunohaematology Laboratory* pg. 11 4.7 Turn Around times
Anti-D/ anti-c quantitation	
Antibody Titration	
Weak D Genotyping/ Extended genotyping	*ED-BB-0147 Blood /group Genetics User guide* pg. 20 Turn Around times

Table 16. ***Tests performed in external laboratories***

Note:

1. ***In the event of an emergency and there is no time to wait for crossmatch-compatible blood, emergency O RhD negative red cells can be issued immediately**
2. ***In an emergency crossmatch-compatible blood could be available within 45 to 60 minutes provided there are no antibodies or serological complications**
3. **** In the event that ABO Rh D compatible platelets are unavailable, the requesting clinician may be phoned by the Blood Bank Medical Scientist to accept an alternative group for their patient. Emergency stock platelet is available at all times in blood bank.**

4.4 Major Haemorrhage Protocol

It is the responsibility of the clinician to contact the Medical Scientist in the event of critical requirements for blood outside of routine hours. Emergency Issue O Rh D Negative units will be issued and Major Haemorrhage Protocol adhered to as required.

Request	Turnaround Time
Emergency Uncrossmatched RCC	≤ 5 minutes
Urgent Group & Crossmatch	45 minutes
Urgent SD Plasma	≤ 30 minutes
Urgent Platelets	2 hours
Urgent Factor Concentrates	10 minutes

Table 17. ***Turnaround Times during Major Haemorrhage Protocol***

4.5 Turnaround Time during Out of Hours

Request	Turnaround Time
Emergency Uncrossmatched RCC	≤ 5 minutes
Urgent Group & Crossmatch	45 minutes
Urgent SD Plasma	≤ 30 minutes
Non-Urgent SD Plasma	2 hours
Urgent Platelets	2 hours
Non-Urgent Platelets	4 hours
Urgent Factor Concentrates	10 minutes
Urgent Anti-D	2 hours
Non-Urgent Anti-D	4 hours or by 13.00 hours on the following day if requested after 20.00 hours.

Table 18. ***Turnaround Time during Out of Hours***

5. SAMPLE ACCEPTANCE/REJECTION

In line with Blood Bank Regulatory Requirements, all requests received by the Blood Bank are subject to inspection to ensure that the following Sample Acceptance Criteria in Blood Bank are met:

5.1 Blood Bank Sample Acceptance Criteria

- The following samples are accepted for routine Blood Bank testing:
  - 4.5ml Sarstedt EDTA Sample – Adult
  - 4.9ml Sarstedt EDTA Sample – Adult
  - 2.7ml Sarstedt EDTA Sample – Paediatric
  - 7.5ml Sarstedt EDTA Sample – Cord Blood
  - 1.6ml Sarstedt EDTA Sample – Newborn

- A smaller volume sample type may be accepted in certain circumstances provided that it is sufficient for the analysis in question e.g. sampling difficulties due to poor veins (2.7ml may be accepted for certain adults)

- Specimen tubes must be in date.

- The specimen must have been taken within 24 hours of receipt at the laboratory as denoted by the time and date stamp on the request form.

- The time of phlebotomy on the sample and the request form must correspond exactly.
  - If the PDA is used it may happen that the labels print out over the cusp of a minute meaning that there may be a one minute discrepancy between the times on the PDA labels on the sample and form. In such cases, the request may be accepted and the earlier time entered on the LIS. If the time discrepancy is greater than 1 minute, or the sample is handwritten with any time discrepancy, the sample may be processed but the time of sample collection must be entered as 00:00 for the date in question.

- All specimens for Blood Bank analyses must be labelled with the following details:
  - **Patient's full Forename and Surname**
    Initials or abbreviations are not acceptable.
    Note: 'Baby Boy' or 'Baby Girl' for neonates - Must include gender
  - **Patient's MRN**
  - **Patient's Date of Birth**
  - **Time and Date of Sample Collection**
  - **Identity of Sample taker**

- Details on specimens must be **hand-written <u>or</u> labelled with an EBTS printed label** only.

- Specimens which are labelled with an addressograph or IPIMS printed label are not acceptable and will be discarded.

- If the **PDA** is used for sample labelling where the patient has a very long name, the name may not print in full. In such cases, the missing letters must be completed on the labels in pen by the sample taker. Otherwise, the request cannot be accepted for processing.

5.2 Blood Bank Request Form Acceptance Criteria

- A valid Request Form *LF-BB-0001 Blood Bank Request Form* <u>must</u> be received for all test requests in blood bank. A letter or request form from another department or site is not an acceptable alternative.

- *LF-BB-0001 Blood Bank Request Form* <u>must</u> include the following details:

  - **Patient's full Forename and Surname.** *Initials or abbreviations are not acceptable. 'Baby Boy' or 'Baby Girl' for neonates - must include gender.*
  - **Patient's MRN**

- **Patient's Date of Birth**
- **Patient's Gender**
- **Identity of Requestor**
- **Identity of Sample Taker**
- **Date and Time of Sample Phlebotomy**
  Note: Identity of Sample Taker and Date and Time of Sample Phlebotomy may be handwritten or an EBTS printed label with this information may be affixed to the Blood Bank Request Form.
- **Patient's Consultant**
- **Reason for transfusion, if applicable**
- **Special Requirements, if applicable**
- **Maternal MRN, Name and Date of Birth** (applies to neonatal paedipack and emergency issue requests only).
- Time of Request
- Bleep number of Requestor, if applicable
- Test Required - e.g. "Group & Screen" (i.e. Group & Antibody Screen) or "Group & Crossmatch", etc.
- Clinical details,
- Transfusion history / Obstetric information

- Details of location of the patient is acceptable on either the specimen or request form.

- A printed addressograph label is required for first entries of patients with no historic Blood Bank entry on the WinPath LIS. *Where details of a patient with no historic entry on the WinPath LIS are handwritten on LF-BB-0001 Blood Bank Request Form, an addressograph label may be obtained, and the request subsequently accepted, provided that all hand-written details are present on the request form and correspond exactly with the addressograph label.*

- Addressograph labels that have been completed by pen (e.g. if the last letter or digit was cut off due to misalignment and the missing information completed in pen) may be accepted once details are confirmed on IPMS. All details on request form and sample must correspond exactly.

- If the details on the addressograph label have been overwritten in pen to change the information, the request cannot be accepted for processing.

- *All requests for product issue or crossmatch must be received on LF-BB-0001 Blood Bank Request Form except during activation of the Major Haemorrhage Protocol.*

6. TERMS OF CROSSMATCH

6.1 Maximum Blood Order Schedule

HI-BB-0040 Maximum Surgical Blood Ordering Schedule (MSBOS) specifies the standard number of units for cross-match/group and hold for elective surgical procedures carried out at Our Lady of Lourdes Hospital. Further information is available on the T Drive.

For all patients with **clinically significant antibodies** please telephone the Blood Bank and/or the Clinical Haematology Team prior to surgery to discuss cross-matching requirements. It is advisable to have cross-matched red cells in advance of surgery for such patients. This applies also to obstetric patients in labour with clinically significant antibodies.

Further Cross-Matching on existing specimens may occur up to 1 week after the collection time indicates or up to 72 hours if the patient was transfused in the last 3 months.

6.2 Historic Blood Group & Requirement for a Second Sample

Blood or blood products should not be issued against a first time sample except in cases of bleeding emergency or urgent theatre.

PCC and factor concentrates may be issued in the absence of a blood group.

IF PATIENT IS FOR BLOOD TRANSFUSION, A 2nd SAMPLE FROM A DIFFERENT PHLEBOTOMY EPISODE IS REQUIRED

- Samples may be 2 x "current" samples taken from different Phlebotomy episodes, or one "current" sample and one historical sample.
- A "current" G&S sample is < 7 days old, except if the patient has had a transfusion <3 months ago or is pregnant, in which case a current G&S sample is < 3 days/72 hours old.
- Check Ward Enquiry -> (defaults to search 6 months - set dates to search past 10 years).
    - If a historic blood group is on system, a 2nd sample IS NOT required;
    - If a historic blood group is not on system a 2nd sample IS required
- 2nd samples must be from a different phlebotomy episode – i.e.
- Drawn >30 minutes after the 1st sample.
- New Blood Bank Request Form (fully-completed).
- Labelled in the presence of the patient immediately after sample collection.
- Request forms for 2nd samples can be left for the phlebotomy round, if time permits
- Second samples are subject to the sample and request form acceptance criteria outlined above.

7. FURTHER EXAMINATION OF THE PRIMARY SPECIMEN

The ward or requesting clinician will be contacted if an additional sample is required for further examination of the primary specimen. Additional samples must be labelled as described in this document.

For the issue of any blood products with the exception of factor concentrates, there must be two samples on file. They may be two current samples taken from different Phlebotomists or one current and one historical sample.

In urgent situations where time does not allow i.e. the bleeding patient, the second sample must be taken. Blood can be cross-matched on the first sample but a second sample is required.

Test/Profile	Requirements for Further Testing
Cross-match of Red Cell Concentrate (Adult)	Most recent sample for Blood Group and Antibody Screen must be less than I week old or less than 72 hours old if transfused or pregnant within the last 3 months.
Cross-match of Paedipack (<4 months)	Most recent maternal sample for Blood Group and Antibody Screen must be less than 72 hours old **AND** historic or current Neonatal Blood Group.
Direct Coombs Test	Most recent sample for Blood Group and Antibody Screen must be less than 48 hours old.
Issue of Anti D Immunoglobulin	Most recent sample for Blood Group and Antibody Screen must be less than 7 days old.
Issue of Solvent Detergent (SD) Plasma (Octaplas/Uniplas)	Any historic Blood Group and Antibody Screen.
Issue of Platelets	Any historic Blood Group and Antibody Screen.
Issue of Factor Concentrates (Factor VIII, Factor IX, OCTAPLEX and Fibrinogen Concentrate)	Blood Group not required.
Issue of Routine Anti-D Prophylactic	Pre-transfusion sample must be taken. Issued on the Booking Sample

Table 19. ***Requirements for Additional Blood Bank Testing Initiated by the Requestor***

8. BLOOD BANKING IN PREGNANCY

8.1 Specimens and Request Forms

It is essential that samples from pregnant women are correctly identified and that request forms are accurately completed. Samples for antenatal screening are identified to the same standard as pre-transfusion samples

The record of ABO/D type derived from an antenatal sample may be used as the basis for the provision of a cross match.

Misidentification can also lead to a failure in or inappropriate administration of prophylactic anti-D.

It is essential that any previous administration of anti-D in the current pregnancy, including date and dose, is recorded on the laboratory request form. Clinical history, particularly of HDN and previous transfusions, is also essential.

8.2 Ante-natal Testing Protocols

All pregnant women should be ABO and D typed and screened for the presence of red cell antibodies early in pregnancy and at 28 weeks gestation. Testing for high levels of immune anti-A or anti-B in pregnant women is not recommended as their presence neither predicts ABO HDN nor does it cause problems in utero.

All pregnant women should have samples taken early in pregnancy, ideally 10-16 weeks gestation, for ABO and D typing and for screening for the presence of red cell alloantibodies.

When an antibody screen is positive further tests should be carried out to determine the antibody specificity and significance.

All pregnant women, whether D positive or D negative, should have a further blood sample taken at 28 weeks gestation for re-checking the ABO and D group and further screening for red cell alloantibodies.

D positive women are just as likely as D negative women to form antibodies, other than anti-D, late in pregnancy. No further routine blood grouping or antibody screening is necessary after 28 weeks. There is evidence that antibodies detected only in the 3rd trimester do not cause HDN.

8.3 Red Cell Antibodies Detected

When red cell antibodies are detected, further testing of maternal blood should be undertaken to determine the specificity, concentration, origin and level of antibody or antibodies, and the likelihood of HDN.

Anti-D, anti-c and anti-K are the antibodies most often implicated in causing HDN severe enough to warrant antenatal intervention.

8.4 Women with Anti-D Present

Ensure that as a service user and/or Clinician that you are aware of the *LI-BB-0032 Guidelines for Blood Grouping and Antibody Screening in Pregnancy.*

8.5 Cord Samples

Cord blood testing is an essential part of the investigation of Haemolytic Disease of the New-born. The request form for the cord testing should carry the Mother's First Name and the Mother's Surname and identify the patient as "baby" stating that the sample is cord blood. The labelling should include:

- An indication that the sample is cord blood and "baby of"
- Mother's First Name

- Mother's Surname
- Baby's MRN and date of birth
- Date and time of sample collection
- Signature of Phlebotomist

If the baby has a name of its own, this may be included on the form or sample but should be in addition to the mother's name.

Whenever a maternal blood sample has been found to contain an immune irregular antibody e.g. Anti-K, Anti-c, etc., then a Group and DCT should also be performed on a cord blood sample. In addition to Ant-D, Anti-c and Anti-K are antibodies most often implicated in causing haemolytic disease severe enough to warrant antenatal intervention.

9. RETENTION OF SPECIMENS AND REQUEST FORMS

Blood Bank specimens for Our Lady of Lourdes Hospital are retained in temperature controlled conditions in the Blood Bank for one week from the day of testing. Samples from Louth County Hospital are frozen for 21 days. All samples are held for 14 days.
Blood Bank request forms are retained by the Blood Bank for 30 years in line with the regulatory requirements.

HAEMATOLOGY

1. HAEMATOLOGY INTRODUCTION

1.1 Service Description

Haematology comprises the study of blood disorders which affect blood cells, haemoglobin, blood proteins and the mechanism of coagulation. The Haematology team based in Our Lady of Lourdes Hospital are available for haematology advice.

1.2 Contact Details

Section	Phone Extension Inside the Hospital	Phoning from Outside the Hospital
Haematology & Coagulation	2103	041 9837601 ext. 2103
Haematology Chief Medical Scientist	2662	041 9837601 ext. 2662

Table 20: ***Contact Details***

2. HAEMATOLOGY TEST INDEX

2.1 Urgent/ Routine Haematology Tests

The turnaround times shown in the Table 21. *Haematology Tests* and Table 22. *Coagulation Tests* are for routine samples.

All urgent samples are processed within 2 hours with the exception of samples from Oncology and Heart Failure which have a turnaround time of 90 minutes.

Malaria Screens, Thrombophilia Screen test including lupus anticoagulant, D-Dimer, and Fibrinogen are no longer available as routine tests for GP's.

Table 21. Haematology Routine Tests				
Test	**Container Type**	**Sample Validity**	**Expected TAT**	**Special Requirements**
FBC*	K-EDTA 2.7ml/1.6ml **Pink Top Tube**	<48hrs	<2hrs	-
ESR		<24hrs	<4hrs	Clinical Details
Reticulocytes**		<12hrs	<2hrs	
Blood Film		<24hrs	<2hrs Scientist <96hrs Consultant	-
Sickle Screen		<48hrs	<24hrs	-
Infectious Mononucleosis Screen		<72hrs	<24hrs	-
Malaria Screen		<2hrs	<2hr routine <24hrs out of hours	Cut-off is 8pm for same day film; Malaria Antigen only after 8pm
Kleihauer		<72hrs	<24hrs	Cut-off is 3pm for same day testing.
Platelet Count (for platelet clumping)	ThromboExact 2.7ml	<48hrs	<2hrs	*For patients with known platelet clumping, the platelet count can be reported on a coagulation (citrated) tube – this must be done in house not referred to Biomnis.*

* **FBC includes**: **Red Blood Cell Count (RBC), Haemoglobin (Hb), Haematocrit (Hct), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH), Mean Cell Haemoglobin Concentration (MCHC), Red Cell Distribution Width (RDW), Platelets, White Blood Cell Count (WBC), Neutrophils** - *absolute & %*, **Lymphocytes** - *absolute & %*, **Monocytes** - *absolute & %*, **Eosinophils**- *absolute & %*, **Basophils**- *absolute & %.*

** **Reticulocytes includes: Absolute & % Reticulocyte Count.**

Table 22. Coagulation Routine Tests				
Test	**Container Type**	**Sample Validity**	**Expected TAT**	**Special Requirements**
PT/INR	Sodium Citrate Coagulation 9 NC 3ml/1.2ml **Green Top**	<24hrs	<2hrs	Must be filled to the green line
APTT/Ratio		<4hrs	<2hrs	Must be filled to the green line
Fibrinogen		<24hrs	<2hrs	Must be filled to the green line
D-Dimer	**Green Top**	<8hours	<2hrs	Must be filled to green line Must provide Wells Score
Mixing Studies	**Green Top**	<4 hours -APTT <24 Hours - PT	<24hours	Must be filled to green line

Clinical details are required for all coagulation requests. lf clinical details are not provided on the request form the coagulation request will not be processed. Discarded samples will not be phoned to clinical areas.

The clinical indications for a coagulation screen are:

- Investigation of a patient with a significant history of bleeding or bruising.
- Monitoring coagulopathy associated with massive transfusion.
- Investigation into Disseminated Intravascular Coagulation (DlC).
- Liver disease.
- Intra-Uterine Death (lUD)
- Patients having liver biopsies, Endoscopic Retrograde Cholangio-Pancreatography
- (ERCP), insertion of a central venous line, or insertion of a permanent pacemaker and
- Undergoing radiological procedures.
- Baseline screening prior to starting anticoagulation.
- ln patients with pre-eclampsic toxaemia (PET)
- Epidural
- Drug overdoses
- Patients on ICU wards
- In-patients with acute pancreatitis

Please contact the Haematology Laboratory or Consultant Haematologist, as appropriate, with any queries in relation to Coagulation Requests.

2.2 Out of Hours Haematology Tests

The following tests are routinely performed Out of Hours. The urgency of the request should be agreed by telephone with the Out of Hours Medical Scientist.

Haematology Out of Hour Tests
FBC
ESR
Reticulocytes
Sickledex – For Urgent Theatre only
Infectious Mononucleosis Screen
Malaria Screen (Up to 11pm-serology **only** after 11pm)
PT/INR
APTT/Ratio
Fibrinogen
D-Dimer

Table 23. ***Out of Hours Haematology Tests***

3. SAMPLE ACCEPTANCE/REJECTION

As discussed in the General Section 6.13 Sample Acceptance/Rejection Policy, above, the Haematology department is similar to other departments re Sample Labelling Acceptance Criteria

An additional request form is required if extra tests are requested on a sample which has already been received in the laboratory.

3.1 Erythrocyte Sedimentation Rate (ESR) Request Criteria

In order for ESR requests to be processed, clinical information on the request form must state the clinical reason for requesting ESR. Additionally, ESR or CRP may be requested at a time as there is no indication for referring two markers of inflammation. The indications for requesting an ESR are limited to the following:

- Systemic Lupus Erythematosus
- Rheumatoid Arthritis – May be indicated by stating patient is taking one of the following drugs: Methotrexate, Leflunomide, hydroxychloroquine, Tofacitinib, Rituximib, Infliximab
- Kawasaki Disease
- Rheumatic Fever
- Hodgkin Lymphoma
- Temporal Arteritis (initial presentations suggest both ESR & CRP in such cases)
- Inflammatory Bowel Disease in children (<16yrs of age)
- Periprosthetic Infection
- Discitis & Tuberculous infection of the spine

- Septic Arthritis in paediatric patients
- Chronic fatigue (see NICE guidance);
- Foot ulcer
- Hypercalcaemia
- Osteoporosis
- Sweats

Requests received with no clinical information will be reported as 'No clinical information supplied, test not available'.

3.2 Coagulation Request Criteria

lf clinical details are not provided on the request form**,** your request will not be processed.

The clinical indications for a coagulation screen are limited and include:

- Investigation of a patient with a significant history of bleeding or bruising.
- Monitoring coagulopathy associated with massive transfusion.
- As part of an investigation into Disseminated Intravascular Coagulation (DlC).
- Liver disease.
- lntra-Uterine Death (lUD)
- Patients having liver biopsies, Endoscopic Retrograde Cholangio-Pancreatography (ERCP), insertion of a central venous line, or insertion of a permanent pacemaker and undergoing radiological procedures
- For baseline screening prior to starting anticoagulation
- Patients with pre-eclampsic toxaemia (PET)
- Paracetamol overdose

For further information please contact the Haematology laboratory or Clinical Haematology Team.

4. COMMUNICATION OF CRITICAL RESULTS

The following results will be phoned to the relevant ward/clinician:

TEST	RESULTS FOR PHONING
Haemoglobin	<7.0 g/dl >19.0 g/dL (1st time only)
Platelets	<20 x10^9/L >1000 x10^9/L (1st time only)
Neutrophils	≤1.0 x10^9/L in non-oncology patients Neutropenia: check for patient ethnicity >50 x10^9/L (1st time only)*
INR	>5.0
APTT	≥50 seconds (if not on heparin / no obvious reason) All prolonged results in boys <16 yrs.
Fibrinogen	<1.5 g/L
Sickledex	Positive (Only if patient is going to Theatre)
ESR	Phone result when clinician querying Temporal Arteritis.
Discarded Samples	All discarded in-house samples. Clotted and Haemolysed samples.
Infectious Mononucleosis	Positive**
Malaria	Positive
Kleihauer	All Positive > 8mL
Morphology	New Acute Leukaemia, TTP, MAHA

Table 24. ***Communication of Critical Results***

*** Non oncology patients and check ethnicity**

****All positive IMs to be phoned to relevant medical personnel. If cannot be contacted, the result should be phoned to the GP surgery when next open.**

5. REFERENCE RANGES

Reference ranges are available on each test report with the exception of pregnancy related reference ranges which are available in this manual. **Reference ranges are as listed in section 5.1, below. Pregnancy-related Reference ranges are as listed in section 5.2, below.**

5.1 HAEMATOLOGY REFERENCE RANGES

- *Ref. LI-HAEM-0045, Rev. No. 2*

Test	Sex	Age	Range	Source
RBC x 10^{12}/L	Both	1 day	3.9 - 5.3	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1-3 days	4.0 - 6.6	
	Both	3 - 7 days	3.9 - 6.3	
	Both	7 - 14 days	3.6 - 6.2	
	Both	14 - 28 days	3.0 - 5.4	
	Both	28 - 56 days	2.7 - 4.9	
	Both	56 - 91 days	3.1 - 4.5	
	Male	3mths - 2yrs	3.7 - 5.3	
	Female	3mths - 2yrs	3.9 - 5.3	
	Male	2 - 6 yrs.	3.9 - 5.3	
	Female	2 - 6 yrs.	3.9 - 5.3	
	Male	6 - 12 yrs.	4.0 - 5.2	
	Female	6 - 12 yrs.	4.0 - 5.2	
	Male	12 - 18 yrs.	4.5 - 5.3	
	Female	12 - 18 yrs.	4.1 - 5.1	
	Male	Adult	4.5 - 5.9	
	Female	Adult	4.0 - 5.2	

Test	Sex	Age	Range	Source
Hb g/dL	Both	0 - 2 days	13.5 - 19.5	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	2 - 4 days	14.5 - 22.5	
	Both	4 - 8 days	13.5 - 21.5	
	Both	8 - 21 days	12.5 - 20.5	
	Both	21 - 35 days	10.0 - 18.0	
	Both	35 - 63 days	9.0 - 14.0	
	Both	63days - 18mths	10.5 - 13.5	
	Male	18mths - 3yrs	10.5 - 13.5	
	Female	18mths - 3yrs	10.5 - 13.5	
	Male	3 - 7yrs	11.5 - 14.5	
	Female	3 - 7yrs	11.5 - 14.5	
	Male	7 - 13yrs	11.5 - 15.5	
	Female	7 - 13yrs	11.5 - 15.5	
	Male	13 - 19yrs	13.0 - 16.0	
	Female	13 - 19yrs	12.0 - 16.0	
	Male	Adult	13.0 - 18.0	
	Female	Adult	11.5 - 16.5	

Test	Sex	Age	Range	Source
Hct L/L	Both	0 - 2 days	0.42 - 0.6	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	2 - 4 days	0.45 - 0.67	
	Both	4 - 8 days	0.42 - 0.66	
	Both	8 - 21 days	0.39 - 0.63	
	Both	21 - 35 days	0.31 - 0.55	
	Both	35 - 49 days	0.34 - 0.40	
	Both	49 - 63 days	0.28 - 0.42	
	Both	63 - 98 days	0.29 - 0.41	
	Both	98days - 3yrs	0.33 - 0.39	
	Male	3 - 13yrs	0.35 - 0.45	
	Female	3 - 13yrs	0.35 - 0.45	
	Male	13 - 19yrs	0.37 - 0.49	
	Female	13 - 19yrs	0.36 - 0.46	
	Both	Adult	0.36 - 0.46	

Test	Sex	Age	Range	Source
MCV fL	Both	0 - 2 days	98 - 118	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	2 - 4 days	95 - 121	
	Both	4 - 8 days	88 - 126	
	Both	8 - 21 days	86 - 124	
	Both	21 - 35 days	85 - 123	
	Both	35 - 63 days	77 - 115	
	Both	63 - 98days	74 - 118	
	Both	98days - 3yrs	70 - 86	
	Both	3 - 6yrs	75 - 87	
	Male	6 - 13yrs	77 - 96	
	Female	6 - 13yrs	77 - 96	
	Male	13 - 19yrs	78 - 97	
	Female	13 - 19yrs	78 - 97	
	Both	Adult	78 – 97	

Test	Sex	Age	Range	Source
MCH pg	Both	0 - 4 days	31 - 37	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	4 - 35 days	28 - 40	
	Both	35 - 63 days	26 - 34	
	Both	63 - 98 days	25 - 35	
	Both	98days - 3yrs	23 - 31	
	Both	3 - 7 days	24 - 30	
	Male	7 - 13yrs	25 - 33	
	Female	7 - 13yrs	25 - 33	
	Male	13 - 19yrs	25 - 35	
	Female	13 - 19yrs	25 - 35	
	Both	Adult	26 – 34	

Test	Sex	Age	Range	Source
MCHC g/dL	Both	0 - 1 day	30 - 33	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 2 days	29 - 34	
	Both	2 - 14 days	28 - 35	
	Both	14 -56 days	29 - 34	
	Both	56 days - 2yrs	30 - 33	
	Both	Adults	31.5 - 37	
Retics x10^9/L	Both	0 - 1 day	324 - 617	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 5 days	85 - 400	
	Both	5 days – 1 month	34.2 -724	
	Both	1 - 3 months	21.3 - 205	
	Both	3 - 12 months	8.0 - 171	
	Both	1 - 3 yrs.	55.6 - 120	
	Both	3 – 7 yrs.	16.4 - 120.7	
	Both	Adult	35.2 - 122.8	
% Retics	Both	0 - 1 day	1.72 - 8.62	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital,**

Test	Sex	Age	Range	Source
				Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition
	Both	1 - 5 days	1.9 - 9.1	
	Both	5 days - 1 month	0.1 - 6.9	
	Both	1 - 3 months	0.1 - 6.27	
	Both	3 - 12 months	0.1 - 4.7	
	Both	1 - 3 yrs.	0.35 - 2.95	
	Both	3 - 7 yrs.	0.25 - 2.57	
	Both	Adult	0.75 - 2.7	
RDW %	Both	All	11.0 - 16.0	Our Lady's Hospital for Sick Children Crumlin
Platelets x 10^9/L	Both	All	150 - 450	Our Lady's Hospital for Sick Children Crumlin

Test	Sex	Age	Range	Source
WBC x 10^9/L	Both	0 - 7days	10.0 - 26.0	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	7days - 1 yr.	6.0 - 18.0	
	Both	1 - 8 yrs.	5.0 - 15.0	
	Both	8 - 13 yrs.	4.5 - 13.5	
	Both	Adult	4.0 - 11.0	
Neutrophils x 10^9/L	Both	0 - 1 day	5.0 - 13.0	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 3 days	1.5 - 7.0	
	Both	3days - 2yrs	1.0 - 8.5	
	Both	2 - 6 yrs.	1.5 - 8.5	
	Both	6 - 12 yrs.	1.5 - 8.0	
	Both	12 - 16yrs	1.8 - 8.0	
	Both	Adult	2.0 – 7.0	

Test	Sex	Age	Range	Source
Lymphocytes x 10^9/L	Both	0 -1 day	3.5 - 8.5	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Beaumont Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 3days	2.0 - 5.0	
	Both	3days - 2yrs	3.0 - 13.5	
	Both	2 - 6yrs	2.0 - 9.5	
	Both	6 - 12yrs	1.5 - 7.0	
	Both	12 - 16yrs	1.2 - 5.2	
	Both	Adult	1.0 - 4.0	
Monocytes x 10^9/L	Both	0 -1 day	0.5 - 1.5	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 3 days	0.3 - 1.1	
	Both	3days - 6yrs	0.3 - 1.5	
	Both	6 - 16 yrs.	0.1 - 0.8	
	Both	Adults	0.2 - 1.0	

Test	Sex	Age	Range	Source
Eosinophils x 10^9/L	Both	0 -1 day	0.1 - 2.5	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 3 days	0.2 - 2.0	
	Both	3days - 2yrs	0.1 - 0.3	
	Both	2 - 6 yrs.	0.3 - 0.8	
	Both	6 - 16 yrs.	0.1 - 0.8	
	Both	Adult	0.02 - 0.5	
Test	**Sex**	**Age**	**Range**	**Source**
Basophils x 10^9/L	Both	0 - 1 day	0.02 - 0.1	**Our Lady's Hospital for Sick Children Crumlin, Great Ormond Street Hospital, Dacie & Lewis Practical Haematology 10th Edition and Pediatric Haematology 3rd Edition**
	Both	1 - 3 days	0.02 - 0.1	
	Both	3days - 6 yrs.	0.02 - 0.1	
	Both	6 - 16yrs	0.0 - 0.2	
	Both	Adult	0.02 - 0.1	

Test	Sex	Age	Range	Source
Prothrombin Time (Seconds)	Both	0 - 1 Day	10.1 - 15.9	**All paediatric levels from Our Lady's Hospital for Sick Children Crumlin and adult range from in house study**
	Both	2 - 5 Days	9.5 - 15.3	
	Both	6 - 30 Days	9.3 - 14.3	
	Both	31 - 90 Days	9.6 - 14.2	
	Both	91 - 180 Days	10.7 - 13.9	
	Both	6mths - 5yrs	10.6 - 11.4	
	Both	5 - 10yrs	10.1 - 12.1	
	Both	10 - 16yrs	10.2 - 12.0	
	Both	Adult	10.1 - 14.5	
Test	**Sex**	**Age**	**Range**	**Source**
Activated Partial Thromboplastin Time (Seconds)	Both	0 - 1 Day	31.3 - 53.6	**All paediatric levels from Our Lady's Hospital for Sick Children Crumlin and adult range from in house study**
	Both	2 - 5 Days	25.4 - 59.8	
	Both	6 - 30 Days	25.6 - 55.2	
	Both	31 - 90 Days	24.1 - 50.1	
	Both	91 - 180 Days	28.1 - 42.9	
	Both	6mths - 5yrs	24 - 36	
	Both	5 - 10yrs	26 - 36	
	Both	10 - 16yrs	26 - 37	
	Both	Adult	24 – 36	

Test	Sex	Age	Range	Source
D-Dimer HS500 µg/mL	Both	All	0.215 - 128	**Werfen**
Fibrinogen g/L	Both	All	1.8 - 5.0	**Werfen**
Anti-Xa (LMWH) IU/mL	Both	All	No reference range	**Clinical interpretation provided by clinical haematology team**
Anti-Xa (Apixaban) ng/mL	Both	All	No reference range	
Anti-Xa (Rivaroxaban) ng/mL	Both	All	No reference range	
ESR mm/hr	Male	<17yrs	0 - 12	**Dacie & Lewis Practical Haematology 10th Edition**
	Male	17 - 50yrs	0 - 10	
	Male	51 - 60yrs	0 - 12	
	Male	61 - 70yrs	0 - 14	
	Male	>70yrs	0 - 30	
	Female	<17yrs	0 - 12	
	Female	17 - 50yrs	0 - 12	
	Female	51 - 60yrs	0 - 19	
	Female Female	61 - 70yrs >70yrs	0 – 20 0 -35	

5.2 PREGNANCY RELATED REFERENCES IN HAEMATOLOGY

6 *LI-HAEM-0081 Pregnancy Related References in Haematology* (Rev. No. 0)

Parameter	First Trimester	Second Trimester	Third Trimester*
RBC ($x10^{12}$/L)	3.52-4.52	3.20-4.41	3.10-4.44
Hb (g/dL)	11.0-14.3	10.0-13.7	9.8-13.7
HCT (L/L)	0.31-0.41	0.30-0.38	0.28-0.39
MCV (fL)	81-96	82-97	91-99
WBC ($x10^9$/L)	5.7-13.6	6.2-14.8	5.9-16.9
Neutrophils ($x10^9$/L)	3.6-10.1	3.8-12.3	3.9-13.1
Lymphocytes ($x10^9$/L)	1.1-3.5	0.9-3.9	1.0-3.6
Monocytes ($x10^9$/L)	0.0-1.0	0.1-1.1	0.1-1.1
Eosinophils ($x10^9$/L)	0.0-0.6	0.0-0.6	0.0-0.6
Basophils ($x10^9$/L)	0.0-0.1	0.0-0.1	0.0-0.1
Platelets ($x10^9$/L)	174-391	171-409	155-429

* Third trimester reference range is applicable for 6 weeks post-delivery Source of Ranges: *Blood Cells. A Practical Guide. Barbara J. Bain; 4th Edition*

BIOCHEMISTRY

1. BIOCHEMISTRY INTRODUCTION

1.1 Service Description

The Biochemistry Department is responsible for measurement of clinical constituents (ranging from ions to complex proteins) of body fluids, for use not only in diagnosis of disease, but also in monitoring the course of disease, the effect of treatment, prognosis and screening. This Department also provides analysis of hormones, drugs and tumour markers.

1.2 Contact Details

Section	Phone Extension Inside the Hospital	Phoning from Outside the Hospital
Biochemistry	4795	041 9837601 ext. 4795

Table 25. ***Biochemistry Contact Details***

2. BIOCHEMISTRY TEST INDEX

2.1 Routine Biochemistry Tests

*****NWD = next routine working day i.e. Monday to Friday

All urgent samples are processed within 2 hours with the exception of samples from Oncology, Heart Failure and Troponin (TAT 90 minutes).

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turn Around Time (NWD)*
Clinical Chemistry					
Renal Profile Sodium/Potassium Chloride/Creatinine/Urea	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Liver Profile Total Bilirubin/ALT/ALP GGT/Total Protein/ Albumin/AST if ALT>100	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Bone Profile Calcium/Phosphate/ALP Albumin	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Ions Profile Calcium/Albumin/ Corrected Calcium/ Phosphate/Magnesium	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Fasting Lipid Profile Cholesterol/Triglyceride HDL/LDL	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day

Troponin I	Blood	Li Heparin	2.7ml	Orange Top Tube	90 minutes
Bile Acids	Blood	Serum Gel Serum	4.9/2.7ml 1.1ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube	Same day
Vitamin D	Blood	Serum Gel Serum	4.9/2.7ml 1.1ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Bicarbonate	Blood	Serum Gel Serum	4.9/2.7ml 1.1ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube	Same day
Total Protein/ALB/LDH	Fluids	None	1ml	Universal Container	Same day
Glucose & Protein	CSF	None	0.5ml	Glass Container	2 hours
Glucose	Blood	Fluoride EDTA	4.9/2.7ml 1.2ml (Paed)	Yellow Top Tube Yellow Top Tube	Same day
Amylase	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Magnesium	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Uric Acid	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
HbAIc	Blood	EDTA	2.7mls	Pink Top Tube	Same day
Ammonia **(Deliver on ice, spin & separate immediately)**	Blood	Li Heparin	4.9/2.7ml 1.2ml (Paed)	Orange Top Tube	2 hours if urgent
Lactate **(Must be delivered in lab within 15mins of draw)**	Blood	Fluoride EDTA	2.7ml (Adult) 1.2ml (Paed)	Yellow Top Tube Yellow Top Tube	2 hours
Immunoglobulins **(IgA, IgG and IgM)**	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	Same day
Osmolality	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 2.7ml (Adult) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube Orange Top Tube	Same Day

Specific Proteins					
C-Reactive Protein (CRP)	Blood	Serum Gel Serum Li Heparin	4.9/2.7ml 1.2ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube Orange Top Tube	Same day
Procalcitonin	Blood	LI Heparin	2.7ml	Orange Top Tube	Same Day
Rheumatoid Factor (RA)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	Same day
Endocrinology					
Thyroid Stimulating Hormone (TSH)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Free T4 (T4)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Free T3 (T3)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Anti-Thyroid Peroxidase Antibodies	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Follicle Stimulating Hormone (FSH)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Luteinising Hormone (LH)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Oestradiol	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Progesterone	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Prolactin	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
B-HCG	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	Same Day
Cortisol	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Haematinics					
B12	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Folate	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Ferritin	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Iron	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Transferrin Saturation	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Drugs					

Digoxin	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Weekly (Thursday)
Lithium	Blood	Serum	2.7ml (Adult)	White Top Tube	Weekly (Thursday)
Valproic Acid/Epilum	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Weekly (Thursday)
Phenytoin	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Weekly (Thursday)
Paracetamol	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Same Day
Salicylate	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Same Day
Antibiotic Testing					
Gentamycin	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Same day
Vancomycin	Blood	Serum	2.7ml (Adult) 1.2ml (Paed)	White Top Tube	Same day
Tumour Markers					
Prostatic Specific Antigen (PSA)	Blood	Serum Gel	4.9/2.7ml	Brown Top Tube	NWD
CA 19-9	Blood	Serum Gel	4.9/2.7ml	Brown Top Tube	NWD
CA 125	Blood	Serum Gel	4.9/2.7ml	Brown Top Tube	NWD
CA 15.3	Blood	Serum Gel	4.9/2.7ml	Brown Top Tube	NWD
CEA	Blood	Serum Gel	4.9/2.7ml	Brown Top Tube	NWD
Alpha Feto Protein (AFP)	Blood	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Urinary Chemistries					
Sodium/Potassium/ Chloride	Random urine 24 hours	None	10-20mls	Universal Container 24 hour Container	Same Day
Urinary Amylase	Random urine	None	10-20mls	Universal Container	Same Day
Microalbumin Albumin /Creatinine Ratio	Random urine 24 hour urine	None	10-20mls Urine voided in 24 hr period	Universal Container 24 hour Container	Same Day
Protein	24 hour urine	None	Urine voided in 24 hr period	24 hour Container	Same Day
Calcium	Random urine 24 hours	None	10-20mls Urine voided in 24 hr period	Universal Container 24 hour Container	Same Day
Creatinine Clearance	Blood taken within 24 hrs 24 hour Urine	Gel Tube	2.7mls	Brown Top Tube 24 hour Container	Same Day
Calcium/Creatinine Ratio	Random urine 24 hour urine	None	10-20mls Urine voided in 24 hr period	Universal Container 24 hour Container	Same Day
Protein/Creatinine Ratio	Random urine	None	10-20mls	Universal Container	Same Day

	24 hour urine		Urine voided in 24 hr period	24 hour Container	
Osmolality	Random urine	None	10-20mls	Universal Container	Same Day

2.2 Out of Hours Biochemistry Tests

The following tests are performed Out of Hours. The urgency of the request should be agreed by telephone with the Out of Hours Medical Scientist.

On-Call Biochemistry Tests	
Ammonia (Consultant Request)	**Lithium (Consultant Request)**
Amylase	**Lipid Profile**
AST	**Paracetamol**
Bone Profile	**Phenytoin (Consultant Request)**
Bicarbonate	**Renal Profile**
C-Reactive Protein	**Salicylate**
Creatine Kinase (CK)	**Total & Direct Bilirubin**
CSF Glucose & Protein	**Troponin**
Digoxin (Consultant Request)	**TSH (Consultant Request)**
Glucose	**24 Hour Urinary Protein**
HCG (Consultant Request)	**Uric Acid**
Ion Profile	**Osmolality (urine & serum)**
Urinary Electrolytes	**Urinary Amylase**
Lactate	**Valporate (Consultant Request)**
LDH	**Gentamycin/Vancomycin (available 09:00-17:00 at weekends ; NOT available on–call unless pre-arranged)**
Liver Function Tests	**Bile Acids (9-5 at weekends)**
Procalcitonin	

Table 26. ***Out of Hours Biochemistry Tests***

3. SAMPLE ACCEPTANCE/REJECTION

As discussed in the general section 6.13 Sample Acceptance/Rejection Policy, above, Biochemistry department is similar to other departments re Sample Labelling Acceptance Criteria

Specimen	Request Form	Specimen or Request Form
• Full Name (No abbreviations) • Date of Birth or MRN	• Full Name (no abbreviations) • Date of Birth or MRN • Requesting Clinician (Consultant/GP) • Test request	• Date of specimen collection • Time of specimen collection • Source

Table 27: ***Sample Acceptance Criteria***

All of the above information **MUST:**

- be supplied
- be identical if present on both the specimen and request form
- be legible

Samples are rejected in the following circumstances

- Do not meet the Sample Labelling Acceptance Criteria
- Leaking specimens
- Incorrect/Insufficient specimen for test requested
- Specimen tube out of date
- Large addressograph labels on tubes.

4 ADDITIONAL AND REFLEX TESTS, RETENTION OF SAMPLES & FORMS

4.1 Additional Tests (add-ons)

An additional request form is required if extra tests are requested on a sample which has already been received in the laboratory.

4.2 Reflex Testing

- If Potassium >6mmol/L, calcium and albumin performed
- Total Protein >90g/L, immunoglobulins are tested
- Rheumatoid Factor >35, CRP performed
- AST if ALT > 100
- TSH reflexes T4/Free T3 depending on the TSH results and age of the patient
- Elevated Prolactin, sample referred for Macroprolactin

4.3 RETENTION OF SPECIMENS AND REQUEST FORMS

Biochemistry specimens for Our Lady of Lourdes Hospital are retained in temperature controlled conditions in the Biochemistry department for 5-7 days from the day of testing. Biochemistry request forms are retained for 5-7 days.

If additional tests need to be added to the original request, a further request form is required detailing the date and time of the sample to which the additional tests are to be added. Please contact the Biochemistry Department for further details on sample validity.

5 COMMUNICATION OF CRITICAL RESULTS

Critical results are phoned to relevant ward/clinicians, as per the list below

Biochemistry Critical Results

- *LI-BIO-0012 Critical Results to be Phoned to Clinicians Rev. No. 11*

Analyte	Less than	Greater than	Notes
Serum/Plasma Chemistries			
ALP (IU/L)		5 fold increase	Phone if grossly elevated in pregnancy
ALT (IU/L)		5 fold increase	Phone all elevated results in pregnancy
Amylase (U/L)		300	If amylase is blocked out due to icterus – a urinary amyla can be suggested for analysis.
Ammonia (µmol/L)		All results > normal range	Confirm sample type and receipt time of sample.
AST (IU/L)		5 fold increase	Phone all elevated results in pregnancy
Bicarbonate (Eq/L)	15		Sample must be analysed within **15** mins of first removal of cap.
Bile Acids (µmol/L)		6	Should be phoned on fasting samples only. Phone **first** elevation only **UNLESS** marked elevation in results from previous
Calcium (mmol/L)	1.80	3.0	Applies only to children <1yr (the Corrected Calcium is not reported on these patients) or if Albumin is >40.
Corrected Calcium (mmol/L)	1.80	3.0	If significantly low consider sample EDTA contamination and check sample type, the K will be elevated (see K below).
Chloride (mmol/L)	85		On first occurrence
CK (IU/L)		5 fold increase	
Creatinine (µmol/L)		350	And CRF is ruled out On first occurrence
Direct Bilirubin (µmol/L)		40	First occurrence on a new patient
GGT (IU/L)		5 fold increase	Phone all elevated results in pregnancy

Analyte	Less than	Greater than	Notes
Glucose (mmol/L)	2.5 2.7	15 On a new patient 20 on known diabetics >10 on pregnant women (GTT) ≥ 7.8 on pregnant women(GCT) On Paediatric patients	Low glucose - confirm that it is Fluoride EDTA tube. GTT and GCT results must be phoned to Diabetic CNS.
Immunoglobulins (g/L)		Phone if one Immunoglobulin type is grossly elevated	Suspected myeloma – - discuss with haematology laboratory (film) - phone requesting clinician
Iron (µmol/L)		60	Paediatrics only
Lactic Acid (mmol/L)		All results >normal range	Confirm sample type & receipt time. Lactate is available on blood gas analysers.
LDH (IU/L)		5 fold increase	Phone all elevated results in pregnancy
Magnesium (mmol/L)	0.41	1.5	
Osmolality (mOsm/Kg)	250	335	
Potassium (mmol/L) Adult <u>Children</u> neonate (up to 4 weeks) infant (up to 1 year) child (up to 18 years)	2.6	6.0 serum and plasma 6.5 serum/plasma 6.0 serum/plasma 5.5 serum/plasma	If K is elevated – check for pseudohyperkalaemia - Prolonged tourniquet application prior to venepuncture - Haemolysis during venepuncture - Thrombocytosis (High platelets check plasma K) - Check sample type - Check for contamination (see calcium above) - Check age of sample. Add flag O for old (If unspun for 24 hrs). ***Contact OLOL medical registrar with Dr De Freitas patients.*
Phosphate(mmol/L)	0.35	2.5	If elevated significantly check date. If unspun for 24 hrs hours add O flag.
Procalcitonin (ng/ml)		2.0	
Sodium (mmol/L)	125	152	If sodium is significantly increased in conjunction with drop in urea , creat , total protein ,albumin - enquire if the sample was taken from a drip site
Total Bilirubin (µmol/L)		175 All results > 300	First occurrence on a new patient For neonates.
Total Protein (g/L)		95	
High Sensitivity Troponin (ng/mL)		First elevated results	Marked elevation in results from previous
Triglycerides (mmol/L)		10	>10 don't give HDL result enter @10.0 >15 don't give HDL or LDL enter @15.0
Urea (mmol/L)		25	And CRF is ruled out
Uric Acid (mmol/L)		Upper limit of normal	On pregnant women only

Analyte	Less than	Greater than	Notes
URINE CHEMISTRIES			
24 Urinary Protein (mg/24hr) or Albumin (mg/24hr)		Upper limit of normal (maternity only) 5 fold increase	 First occurrence
Albumin creatinine ratio (mg/mmol)		5 fold increase	First occurrence
Protein creatinine ratio (mg/ mmol)		**30** (maternity & paediatrics) 5 fold increase	 First occurrence
Urinary Amylase		Upper limit of normal	
DRUGS			
Digoxin (nmol/L)		2.56	
Gentamicin (mg/L) Trough Level (Pre-Dose) Peak Level (Post Dose)		1.0 for once daily dose 2.0 for twice daily dose 10	Phone the ward only.
Lithium (mmol/L)		1.8 mmol/L	
Paracetamol (mg/L)		All results > therapeutic range	
Phenytoin (µmol/L)		3 Times upper therapeutic range	
Salicylate (mg/L)		All results >therapeutic range	
Vancomycin (mg/L) Trough level (Pre-Dose) Peak Level (Post Dose)		 20 40	Phone the ward only.
Valporate (µmol/L)		3 Times upper therapeutic range	
TUMOUR MARKERS			
AFP (IU/mL)		5 Times upper limit	First occurrence non oncology
CA19-9 (U/mL)		5 Times upper limit	First occurrence non oncology
CA125 (U/mL)		5 Times upper limit	First occurrence non oncology
CA15-3 (U/mL)		5 Times upper limit	First occurrence non oncology
CEA (IU/L)		5 Times upper limit	First occurrence non oncology
PSA (µg/L)		10	First occurrence or marked increase
HORMONES			
BHCG (ng/mL)		Elevated	Only on a patient on Roaccutane
Cortisol (ng/L)	50	800	Always check request form before authorising cortisol (enter in internal NPD that form checked)
Free T4 (pg/L)		30	
Free T3 (pmol/L)			Interpret in relation to TSH & FT4 levels
Prolactin (mU/L)		>1000 >3000 (Dr Ahern patients only)	Macroprolactin is required when the prolactin result is > reference limit and for only when a macroprolactin has not been reported within the last 12 months. If monomeric prolactin is requested on a form, it should be sent out for macroprolactin. Ref: LP-BIO-0031

Analyte	Less than	Greater than	Notes
TSH (mU/L)	0.1	20 ≥50 neonate	On first elevation only. TSH<0.1 only phone when abnormal FT3 or FT4
CSF			
CSF Glucose (mmol/L)	3.0		
CSF Protein (mg/L)		Upper limit of normal	Blood-stained CSF samples show increased protein levels due to the presence of high protein. If contamination from blood is suspected, confer with the Microbiology Dept. regarding the Red Cell Count and appearance of the CSF. If the sample was blood-stained, add a line and type '@csfh' to give the following comment: 'Sample blood-stained, please interpret with caution'
Unsuitable, Contaminated, Insufficient Or Any Discarded Samples			Phone all inpatients and urgent GP samples only with the exception of Hba1c discards.
Lipaemic samples			Suggest testing of fasting lipids.4+ lipaemic samples should be discarded (DBIO) as grossly lipaemic.
Haemolysed samples			4+ haemolysed samples should be discarded (DBIO) as grossly haemolysed.

6. REFERENCE RANGES

Reference ranges are available on each test report, and listed below.

Biochemistry Reference Ranges

- *LI-BIO-0076 Biochemistry Reference Ranges Rev. No. 3*

Analyte	Units	Reference Range	Age	Sex	Sample type
AFP	KU/L	3-1153	up to 3m	All	Serum
AFP		3-228	Up to 6m	All	
AFP		2-123	Up to 1 yr. :	All	
AFP		2- 17	Up to 3 yr.:	All	
AFP		0.74-7.29	≥3 yr.	All	
Albumin	g/L	28-44	0-4 days	All	Plasma/Serum
Albumin		38-54	4days-14 years	All	
Albumin		35-50	adult	All	
Albumin		34-48	>60	All	
Alk Phosphatase	U/L	121 - 351	1-7 days	Male	Plasma/serum
Alk Phosphatase		138 - 486	8-30 days	Male	
Alk Phosphatase		101 - 467	1-3 mo	Male	
Alk Phosphatase		94 - 425	4-6 mo	Male	
Alk Phosphatase		101 - 394	7-12 mo	Male	
Alk Phosphatase		185 - 383	1-3 yrs.	Male	

Analyte	Units	Reference Range	Age	Sex	Sample type
Alk Phosphatase		191 - 450	4-6 yrs.	Male	
Alk Phosphatase		218 - 499	7-9 yrs.	Male	
Alk Phosphatase		174 - 624	10-11yrs	Male	
Alk Phosphatase		<500	11-12yrs	Male	
Alk Phosphatase		<750	12-15 Years	Male	
Alk Phosphatase		98 - 317	16-19	Male	
Alk Phosphatase		40 - 150	>20	Male	
Alk Phosphatase		107 - 357	1-7 days	Female	
Alk Phosphatase		107 - 474	8-30 days	Female	
Alk Phosphatase		125 - 547	1-3 mo	Female	
Alk Phosphatase		125 - 449	4-6 mo	Female	
Alk Phosphatase		101 - 431	7-12 mo	Female	
Alk Phosphatase		185 - 383	1-3 yrs.	Female	
Alk Phosphatase		191 - 450	4-6 yrs.	Female	
Alk Phosphatase		218 - 499	7-9 yrs.	Female	
Alk Phosphatase		169 - 657	10-11yrs	Female	
Alk Phosphatase		<500	12-13 Yrs.	Female	
Alk Phosphatase		103 - 283	14-15 yrs.	Female	
Alk Phosphatase		40 - 150	>15 yrs.	Female	

Analyte	Units	Reference Range	Age	Sex	Sample type
ALT	IU/l	20-54	1-7 days	Male	Serum/Plasma
ALT		24-59	8days-12 months	Male	
ALT		19-59	1-3yrs	Male	
ALT		24-68	4-19 yrs.	Male	
ALT		0-55	Adult	All	
ALT		21-54	1-7 days	Female	
ALT		22-61	8days-12 months	Female	
ALT		19-59	1-19yrs	Female	
Ammonia	umol/L	18-72	All	All	Plasma
Amylase	IU/l	<18	1-30 days	All	Serum/Plasma
Amylase		<43	31-182 days	All	
Amylase		<81	183-365 days	All	
Amylase		<106	1-18 yrs.	All	
Amylase		25 - 125	Adult	All	
Amylase		20 - 160	> 70 yrs.	All	
Anti-TPO	IU/ml	<5.6	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
AST	IU/l	26-98	1-7 days	Male	Serum/Plasma
AST		16-67	8-days- 4 years	Male	
AST		10-47	5-19 yrs.	Male	
AST		5-34	Adult	All	
AST		20-93	1-7 days	Female	
AST		16-69	8days- 4 yrs.	Female	
AST		5-47	5-15 yrs.	Female	
AST		0-26	16-19 yrs.	Female	
B12	pg/ml	187-883	All	All	Serum
Bile Acids	umol/L	1.0-6 (fasting)	All	All	Serum
CA-125	IU/L	0-35	All	Female	Serum
CA-153	IU/L	0-31.3	All	Female	Serum
CA-199	IU/L	0-37	All	All	Serum
Calcium	mmol/L	1.90-2.60	0-10 days	All	Serum/Plasma
Calcium		2.25-2.75	10days-24 months	All	

Analyte	Units	Reference Range	Age	Sex	Sample type
Calcium		2.20-2.70	2-12 yrs.	All	
Calcium		2.10--2.55	12-18yrs	All	
Calcium		2.10-2.55	18-60 Yrs.	All	
Calcium		2.10-2.55	60-90 yrs.	All	
Calcium		2.20-2.50	>90yrs	All	
CEA	ng/ml	≤5 ng/ml	All	All	Serum
Chloride	mmol/L	98-113	0-28days	All	Serum/plasma
Chloride		98-107	thereafter	All	Serum/plasma
Cholesterol	mmol/L	</=5.00	all	all	Serum/Plasma
Cholesterol HDL		>/=1.00	All	All	Serum/Plasma
Cholesterol LDL		</=3.00	all	all	Serum/Plasma
CK	IU/l	29-303	0-90 days	Male	Serum/Plasma
CK		25-172	3mo-18yrs	male	
CK		30-200	>/=18y	Male	
CK		43-474	0-90 days	Female	

Analyte	Units	Reference Range	Age	Sex	Sample type
CK		27-242	3-12 mo	Female	
CK		25-177	13mo- 18 yrs.	Female	
CK		29-168	>/=18y	Female	
CO2	mEq/L	13-22	0-28 days	All	Serum
CO2		20-28	29 days-17 years inclusive	All	
CO2		22-29	18-59 years	All	
CO2		23-31	>60 years	All	
Cortisol	nmol/L	Pre 10am: 101.2-535.7	All	All	Serum
		Post 5 pm: 79.0-477.8			
Cortisol dynamic testing	nmol/L	Short synacthen test: Normal response is a 30 minute serum cortisol concentration >500 nmol/l 1mg. Overnight dexamethasone suppression test: Normal response is a serum cortisol <= 50nmol/l			

Analyte	Units	Reference Range	Age	Sex	Sample type
Creatinine	umol/l	27-88	1-4days	All	Serum/Plasma
Creatinine		18-35	5days-1 yrs.	All	
Creatinine		27-62	1-12 yrs.	All	
Creatinine		44-88	12-18 yrs.	All	
Creatinine		64-104	>18	Male	
Creatinine		49-90	>18	Female	
CRP	mg/L	≤ 5.0	> 15 yrs.	All	Serum/Plasma
		0.1-4.1	0-3 weeks		
		0.1-2.8	>3weeks -15 yrs.		
CSF Glucose		2/3 Normal Plasma Range	All	All	CSF
CSF protein	mg/L	150 to 400	All	All	CSF
CSF protein		150-1300	Premature		
CSF protein		400-1200	Full term newborn		
CSF protein		200-800	< 1 month		
Digoxin	nmol/L	1.02-2.56 (therapeutic)	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
Direct Bilirubin	umol/l	0.0-8.6	All	All	Serum/plasma
eGFR	ml/min/1.73m2	>90	normal or stage 1 CKD with renal abnormality	male	serum
eGFR		60-89	normal or stage 2 CKD with renal impairment	male	serum
eGFR		30-59	stage 3 CKD (moderate impairment)	male	serum
eGFR		15-29	stage 4 CKD (severe impairment)	male	serum
eGFR		<15	stage 5 CKD (established renal failure)	male	serum
Ferritin	ng/ml	22-274	All	Male	Serum
Ferritin		5-204	All	Female	
Folate	ng/ml	3.1-20.5	All	All	Serum
FSH	U/L	1-12		Male	Serum
		3.0-8.1 (follicular)		menstruating female	
		2.6-16.7 (mid cycle)			

Analyte	Units	Reference Range	Age	Sex	Sample type
		1.4-5.5 (luteal)			
		26.7-133.4 (menopause)		Female	
FT3	pmol/L	3.56-7.48	4 days- < 1 year	Male	Serum
		4.29-6.79	1 - < 12 year	Male	
		4.44-6.65	12 - <15 yr.	Male	
		3.46-5.92	15 - <19 yr.	Male	
		3.56-7.48	4 days- < 1 year	Female	
		4.29-6.79	1 - < 12 year	Female	
		3.84 – 6.06	12 - <15 yr.	Female	
		3.55-5.7	15 - <19 yr.:	Female	
		2.43 – 6.1	>/= 19 years	All	
FT4	pmol/L	10.5-18.8	0 - <1yr	All	Serum
		9.98-14.29	1-19yr		
Gamma GT	IU/l	23-174	1-30d	Male	Plasma/Serum
Gamma GT		16 -147	1-3 mo	Male	

Analyte	Units	Reference Range	Age	Sex	Sample type
Gamma GT		5-93	4-6 mo	Male	
Gamma GT		2-39	7 mo-19yr	Male	
Gamma GT		12-64	>/=20	Male	
Gamma GT		16-148	1d-3mo	Female	
Gamma GT		13-123	4-6 mo	Female	
Gamma GT		8 – 59	7-12 mo	Female	
Gamma GT		2-23	1 yr-19yr	Female	
Gamma GT		9-36	>/=20	Female	
Gentamycin	mg/L	Neonates are on extended interval gentamicin. Trough level <2mg/L (< 1mg/L if more than 3 doses are given) This applies to babies who received gentamicin 24 hourly and 36 hourly.	0 – 28 days	All	Serum
		< 1 (Trough level)	29 days to adult		
		4.0-10.0 (peak)	All	All	Serum
Globulin	g/l	12-36	All	All	Plasma/Serum
Glucose	mmol/L	3-< 6 (fasting)	All	All	Plasma

Analyte	Units	Reference Range	Age	Sex	Sample type
HCG	IU/L	≤5 IU/L: Negative		Female	Serum
		≥25 IU/L : Positive			
Hs Troponin I	pg/ml	<15.6	All	females	Plasma
Hs Troponin I		<34.2	All	males	Plasma
IgA	g/L	0.01-0.34	0-3 mo	All	Serum
IgA		0.08-0.91	>3mo-1 yr.	All	
IgA		0.21-2.91	>1-12 yr.	Male	
IgA		0.63-4.84	>12-60 yr.	Male	
IgA		1.01-6.45	>60y	Male	
IgA		0.21 – 2.82	>1-12 yr.	Female	
IgA		0.65-4.21	>12-60 yr.	Female	
IgA		0.69-5.17	>60y	Female	
IgG	g/L	3.97-17.65	0-1 mo	Male	Serum
IgG		2.05-9.48	>1mo -1 yr.	Male	
IgG		4.75-12.10	>1-2 yrs.	Male	
IgG		5.4-18.22	>2 years	Male	
IgG		3.91-17.37	0-1 mo	Female	

Analyte	Units	Reference Range	Age	Sex	Sample type
IgG		2.03-9.34	>1mo -1 yr.	Female	
IgG		4.83-12.26	>1-2 yrs.	Female	
IgG		5.52-16.31	>2 years	Female	
IgM	g/L	0.06-0.21	newborn	male	Serum
IgM		0.17-1.43	3mo- 1 year	male	
IgM		0.41-1.83	>1 to 12 year	male	
IgM		0.22-2.4	> 12 years	male	
IgM		0.06-0.21	newborn	female	
IgM		0.17-1.5	3mo- 1 year	female	
IgM		0.47-2.4	>1 to 12 year	female	
IgM		0.33-2.93	> 12 years	female	
Iron	umol/L	2.9 - 22.9	0 to < 14 years	All	Serum
		3.6 - 29.0	14 to < 19 years	Female	
		5.5 - 30.1	14 to < 19 years	Male	
		9.0-30.4	All	Female	
		11.6-31.3	All	Male	

Analyte	Units	Reference Range	Age	Sex	Sample type
Lactate	mmol/L	0.5-2.2	All	All	Plasma
LDH	IU/l	178-629	1-30 days	Male	Plasma/Serum
LDH		129-376	1m-12 m	Male	
LDH		141-286	1yr-15yr	Male	
LDH		117-217	16-19 yrs.	Male	
LDH		125-220	<109	All	
LDH		187--600	1-30days	Female	
LDH		152-353	1m-12m	Female	
LDH		129-286	1yr-15yr	Female	
LDH		117-213	16-19yr	Female	
LH	U/L	Follicular:1.8-11.78 U/L	All	Comment with ranges reported on all	Serum
		Mid-cycle :7.59-89.08 U/L		All	
		Luteal: 0.56-14.00 U/L		All	

Analyte	Units	Reference Range	Age	Sex	Sample type
		Post-menopausal without HRT: 5.16-61.99 U/L		All	
		Male:0.57-12.07 U/L		All	
Lithium	mmol/L	0.4-1.3 (therapeutic)	All	All	Serum
Magnesium	mmol/L	0.59-0.88	0-90 days	Male	plasma/serum
Magnesium		0.65 – 1.02	91days 12 mo	Male	
Magnesium		0.65 – 0.90	13-36 mo	Male	
Magnesium		0.61 – 0.90	4-10 yr.	Male	
Magnesium		0.7-0.91	11-20 yr.	all	
Magnesium		0.66-1.07	>20yr	All	
Magnesium		0.61 – 0.84	0-90 days	Female	
Magnesium		0.66 - 0.90	91days 12 mo	Female	
Magnesium		0.62 – 0.90	13-36 mo	Female	
Magnesium		0.66 – 1.03	4-10 yr.	Female	

Analyte	Units	Reference Range	Age	Sex	Sample type
Oestradiol	pmol/L	Follicular:77-921	All	Comment with ranges reported on all	Serum
		Mid-cycle:139-2382			
		Luteal:77-1145			
		Post-menopausal not on HRT: <36.7-103			
		Post-menopausal on HRT: <36.7-528			
		Male:40-162			
Osmolality	mOsm/Kg	275-295	<60y	All	Serum/plasma
Osmolality	mOsm/Kg	280-301	>60y	All	
Paracetamol	mg/L	10-30 (therapeutic)	All	All	Serum
Paracetamol		Toxicity 4 hours post ingestion > 120			
Paracetamol		12 hours post ingestion >50			
Phenytoin	umol/L	40-79 (therapeutic)	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
Phenytoin		24-55	0-3 months	All	
Phosphate	mmol/L	1.25-2.25	</=28 days	Male	Serum/Plasma
Phosphate		1.15-2.15	<365d	Male	
Phosphate		1.00-1.95	<3yr	Male	
Phosphate		1.05-1.80	<6	Male	
Phosphate		0.95-1.75	<9	Male	
Phosphate		1.05-1.85	<12	Male	
Phosphate		0.95-1.65	<15	Male	
Phosphate		0.85-1.60	<18	Male	
Phosphate		1.4-2.5	</= 28 days	Female	
Phosphate		1.2-2.1	<365d	Female	
Phosphate		1.10-1.95	<3yr	Female	
Phosphate		1.00-1.80	<9 years	Female	
Phosphate		1.05-1.70	<12	Female	
Phosphate		0.90-1.55	<15	Female	
Phosphate		0.80-1.55	<18	Female	
Phosphate		0.74-1.52	>18	All	

Analyte	Units	Reference Range	Age	Sex	Sample type
Potassium	mmol/L	3.7-5.9	newborn	All	Serum/plasma
Potassium		4.1-5.3	infant	All	Serum/plasma
Potassium		3.4-4.7	child	All	Serum/plasma
Potassium		3.5-5.1	thereafter	All	Serum
Potassium		3.5-4.5	thereafter	male	plasma
Potassium		3.4-4.4	thereafter	female	Plasma
Procalcitonin	ng/ml	- <0.05 ng/ml : Indicates absence of bacterial infection - <0.5ng/ml: Systemic bacterial infection is not likely. - 0.5 to <2 ng/ml: Systemic bacterial infection is possible but various other conditions are known to induce procalcitonin. - 2 to <10 ng/ml: Systemic bacterial infection is likely. - >=10 ng/ml: Systemic bacterial infection is highly likely.	-		

Analyte	Units	Reference Range	Age	Sex	Sample type
Progesterone	nmol/L	Follicular: <0.318-0.954		Comment with ranges reported on all	Serum
		Luteal: 3.816-50.56			
		Post-menopausal: <0.318-0.636			
		Male: <0.318 – 0.636			
Prolactin	mU/L	72-407		Male	Serum
		109-557		Female	
PSA	ng/ml	<2	<50	Male	Serum
		<3	50-59		
		<4	60-69		
		<5	70+		

Analyte	Units	Reference Range	Age	Sex	Sample type
Rh Factor	IU/ml	<30	All	All	Serum
Salicylate	mg/L	150-300 (therapeutic)	All	All	serum
		>300 toxic			
Sodium	mmol/L	(133 - 145)	All	All	Plasma
Sodium		(136 - 145)	All	All	Serum
TIBC	umol/l	50 - 80	All	All	Serum
Total Bilirubin	umol/L	<137	0-1 day premature	All	Serum/Plasma
Total Bilirubin		<205	1-2 days premature	All	Serum/Plasma
Total Bilirubin		<274	3-5 days premature	All	Serum/Plasma
Total Bilirubin		24-149	0-1 day full term	All	Serum/Plasma
Total Bilirubin		58-197	1-2 days full term	All	Serum/Plasma
Total Bilirubin		26-205	3-5 days full term	All	Serum/Plasma
Total Bilirubin		3.4-20.5	6 days to Adult	All	Serum/Plasma
Total Protein	g/L	46-70	1 to 28 days	all	plasma/serum
Total Protein		47-67	29-182 days	male	plasma/serum

Analyte	Units	Reference Range	Age	Sex	Sample type
Total Protein		55-70	183 to365 days	male	plasma/serum
Total Protein		57-80	1 to 18 years	male	plasma/serum
Total Protein		44-66	29-182 days	female	plasma/serum
Total Protein		56-79	183 to365 days	female	plasma/serum
Total Protein		57-80	1 to 18 years	female	plasma/serum
Total Protein		64-83	adult	all	Serum/plasma
Transferrin	g/L	1.86-3.88	1- 14 yrs.	Male	Serum
Transferrin		1.8-3.91	1-14 yrs.	female	
Transferrin		1.74-3.64	15 -60 yrs.	Male	
Transferrin		1.8-3.82	15-60yrs	female	
Transferrin		1.64-3.44	61 to 80yrs	Male	
Transferrin		1.73-3.60	61-80yrs	female	
Transferrin Saturation		30-40%	All	All	Serum
Triglycerides	mmol/l	<1.7 fasting	All	All	Serum/Plasma

Analyte	Units	Reference Range	Age	Sex	Sample type
TSH	mU/L	0.73-4.77	4 days- <6 months	All	Serum
		0.7-4.17	6 months- <14 yrs.		
		0.47-3.41	14 yrs.- <19 yrs.		
		0.35-4.94	>/=19 yrs.		
Urea	mmol/L	0.3-3.5	1-7 days	All	Serum/Plasma
Urea		0.3-4.3	8-29 days	All	
Urea		0.3-3.8	1-12mo	All	
Urea		1.8-6.0	1-3 yr.	All	
Urea		2.5-6.0	4-13 yr.	All	
Urea		3.0-7.5	14-19 yr.	All	
Urea		3.2-7.4	<50	Male	
Urea		2.5-6.7	<50	Female	
Urea		3.0-9.2	>50	Male	
Urea		3.5-7.2	>50	Female	
Uric Acid	umol/L	210-420	adult	Male	serum/plasma
Uric Acid		150-350	adult	Female	
Uric Acid		208-428	neonate	male	

Analyte	Units	Reference Range	Age	Sex	Sample type
Uric Acid		155-357	neonate	Female	
Uric Acid		119-327	29days to 18 years*	all	
Urinary Calcium 24 hr	mmol/24 hrs	2.5-7.5	All	All	Urine
Urinary Creatinine 24 hour	mmol/day	None quoted		All	Urine
Urinary 24 hour chloride	mmol/24 hours	2-10	Infant	All	Urine
Urinary 24 hour chloride	mmol/24 hours	15-40	Child	All	Urine
Urinary 24 hour chloride	mmol/24 hours	110-250	Adult	All	Urine
Urinary 24 hour microalbumin	mg/24 hour	<30	all	all	urine
Urinary 24 hour	mmol/24	25-125	All	All	Urine

Analyte	Units	Reference Range	Age	Sex	Sample type
potassium	hours				
Urinary 24 hour sodium	mmol/24 hours	41-115	6-10 years	Male	Urine
Urinary 24 hour sodium	mmol/24 hours	63-177	10 to 14 years	Male	Urine
Urinary 24 hour sodium	mmol/24 hours	40-220	Adult	Male	Urine
Urinary 24 hour sodium	mmol/24 hours	20-69	6-10 years	Female	Urine
Urinary 24 hour sodium	mmol/24 hours	48-168	10 to 14 years	Female	Urine
Urinary 24 hour sodium	mmol/24 hours	40-220	Adult	Female	Urine
Urinary 24 Hour Urinary Protein	mg/24hrs	20-300	All	All	Urine
Urinary Amylase	IU/l	24-400 U/L	All	All	Urine

Analyte	Units	Reference Range	Age	Sex	Sample type
Urinary Calcium	mmol/l	None quoted	all	all	urine
Urinary Calcium Creatinine Ratio	N/A	<0.4	All	All	Urine
Urinary Chloride	mmol/L	None quoted	All	All	Urine
Urinary Creatinine (spot)	mmol/L	None quoted	All	All	Urine
Urinary Creatinine Clearance ml/min	ml/min/1.73m2	61-147	Adult	Male	Urine
Urinary Creatinine Clearance ml/min	ml/min/1.73m2	59-151	Adult	Female	Urine
Urinary Microalbumin Creatinine Ratio	mg/mmol	<3.0	all	all	Urine
Urinary Osmolality	mOsm/Kg	- For patients ≤ 16 years old - 'Interpret with plasma osmolality, plasma sodium, urinary sodium and renal function. Contact the Biochemistry Department on 4795 for further	All	All	Urine

Analyte	Units	Reference Range	Age	Sex	Sample type
		advice. - For patients > 16 years old - 'Interpret with serum osmolality, serum sodium, urinary sodium and renal function. Contact the Biochemistry Department on 4795 for further advice.			
Urinary Potassium	mmol/L	None quoted	All	All	Urine
Urinary Protein Creat Ratio	mg/mmol	<23	All	All	Urine
Urinary Sodium	mmol/L	None quoted	All	All	Urine
Urinary Spot micro-albumin	mg/l	none	all	all	urine
Urinary Spot Protein	mg/l	none quoted	All	All	spot urine
Valproate	umol/L	350-700	All	All	Serum
Vancomycin	mg/L	15.0-20.0 (trough)	All	All	Serum
Vancomycin		20-40 (peak)	All	All	
Vitamin D	nmol/L	- Increased risk of deficiency <30nmol/l	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
Vitamin D		- Increased risk of in adequacy<40nmol/l	All	All	
Vitamin D		- Adequacy >50nmol/l -	All	All	
Vitamin D		- > 125 nmol/l Increased risk of excess	All	All	

POINT OF CARE TESTING

1. POINT OF CARE INTRODUCTION

1.1 GENERAL

Point of Care Testing (POCT) refers to analytical tests performed by non-laboratory staff at the patient beside. The rapid test result has allowed increased clinical effectiveness, contributing to improved patient outcome and bed management. POCT has rapidly grown in the last few years, in line with changes in clinical practices and needs. POCT devices range from disposable handheld kits to diagnostic desktop analysers.

POCT services at Our Lady of Lourdes Hospital Drogheda are delivered in a high quality, safe manner with reliable results which are available in the patient's records. The POCT steering group will ensure that the structures, systems and processes are in place to provide the framework for efficient POCT.

1.2 ARRANGEMENTS FOR TRAINING IN POINT OF CARE TESTING (POCT)

Training in Point of Care Testing is provided for each POCT device type by the POCT Manager in conjunction with relevant Clinical Nurse Managers and Suppliers of POCT devices.

For any training requirements, contact the Point of Care Manager, using the details set out in General Section 4, above.

1.3 ARRANGEMENTS FOR REQUESTING NEW POINT OF CARE TESTING (POCT) DEVICES / TESTS

All New Point of Care Tests or Devices in Our Lady of Lourdes Hospital must be implemented in a controlled manner, following agreement at the Point of Care Testing Steering Committee.

To initiate this process, *MF-POCT-0002 Application form for a Point of Care Testing (POCT) service in Our Lady of Lourdes Hospital, Drogheda*, (available from the Point of Care Manager) must be completed.

For any queries in relation to new POCT requirements, contact the Point of Care Manager, using the details set out in General Section 4, above.

1.3 USE OF POINT OF CARE TESTING (POCT) DEVICES

All POCT requests must be made by or on behalf of an identified Hospital Consultant caring for the patient, who will be responsible for acting on any Critical Test Results that arise.

Self-testing of staff, or testing of others known to staff, without a request complete by a Clinician, is **not** permitted.

POCT devices must be used at all times, as instructed in training.

1.4 CRITICAL POINT OF CARE TESTING (POCT) RESULTS

Where critical test results are obtained on POCT devices, confirmatory laboratory testing should be carried out before clinical interventions are made.

1.5 REQUESTS FOR SUPPLIES, SERVICE OR TROUBLESHOOTING POINT OF CARE TESTING (POCT) DEVICES

POCT devices must be used at all times, as instructed in training.

Schedules are in place via the laboratory to maintain POCT devices in a verified state and available for use.

In the event of requirements for supplies, service or troubleshooting of POCT devices, contact the Point of Care Manager, using the details set out in General Section 4, above. In the absence of the Point of Care Manager, contact the Biochemistry Laboratory at ext. 4795.

2. POINT OF CARE TEST INDEX

2.1 Blood Gas Analysers

Blood gas analysers are available throughout the hospital. If the analyser is malfunctioning in a particular area, contact the Point of Care Manager (Claire.Marmion@hse.ie) or Biochemistry Department (4795) to log the fault. In the meantime, use the analyser that is designated as the back-up analyser for your area.

Area	Designated Back-up
Emergency Resus Department	ED Majors
ED Majors	Emergency Resus Department
ICU	HDU
HDU	ICU
Labour Ward	Special Care Baby Unit
Special Care Baby Unit	Labour Ward
Newgrange Level 1	Laboratory
Newgrange Level 4	HDU / ICU
Biochemistry Department	ED Majors
Louth County Hospital	N/A
Drogheda Cottage Hospital	ED Majors

Table 28. ***Blood Gas Analysers***

2.2 Glucose/ Ketone meters

Glucose / Ketone meters are widely available across the 3 hospitals in the Louth Hospitals Group – OLOL, LCH and DCH.

2.3 HbA1c meters

HbA1c meters are currently available in Paediatric Out-patients and Adult Out-patients.

2.4 Brain Neuro-Peptide (BNP) meters

BNP meters are currently available in ICU, CCU and Cardiology Out-patients.

3. POCT SPECIMEN COLLECTION, LABELLING, TESTING, REPORTING & WASTE DISPOSAL

1. BRING ALL SPECIMEN COLLECTION ITEMS TO THE PATIENT BED-SIDE & PERFORM APPROPRIATE HAND HYGIENE.

a. **PATIENT IDENTIFICATION FROM CHART (i.e. ADDRESSOGRAPH) –NB deal with one patient and one addressograph at any given time.**
b. **REQUIRED TUBES /COLLECTION CONTAINER & COLLECTION EQUIPMENT,**
c. **POCT DEVICE (if portable)**
d. **YOUR OWN ID SWIPE CARD**

2. POSITIVELY IDENTIFY THE PATIENT

- Ensure patient's addressograph is attached to your hand/arm where it can remain visible to you until POCT testing and reporting is complete
- Check that details on Addressograph and ID Wristband match:
  i. MRN
  ii. FULL NAME
  iii. DATE OF BIRTH
- **Get patient to confirm their Name and Date of Birth** & **ensure this matches details on Request Form**. If <16/unconscious/not *compos mentis*, parent, guardian or nurse must confirm details
- Resolve any discrepancies before sampling.

3. COLLECT SAMPLES & IF APPLICABLE, LABEL THEM IN THE PRESENCE OF PATIENT, AFTER COLLECTION

- For Arterial or Capillary Blood Gas,
  - Draw the sample into the tube using appropriate technique, ensuring to retain patient addressograph on arm/hand if not possible to attach to collection tube
- For Venous Blood Gas:
  - Using correct venepuncture procedures, collect blood samples into the appropriate **unlabelled** POCT tubes, using correct Order of Draw – Venous Blood Gas is drawn **last**.

4. TEST POCT SAMPLE(S)

- **If POCT device is portable**:
  - In the presence of the patient, enter user and patient details (MRN, Surname) and test the sample using the appropriate technique.

- **If the POCT device is in a fixed location:**
  - Retain patient addressograph on hand (if not possible to attach to collection tube) and proceed to the POCT device. Enter user and patient details (MRN, Surname) prior to testing and test the sample using the appropriate technique.

5. REPORT POCT RESULTS

- **If POCT device does not print results** *(and results are not interfaced to Information System)*:
    i. If possible, transcribe results directly into the patient chart.
    ii. If it is not possible to transcribe results directly into the chart, attach the addressograph to a page and transcribe the results onto a separate page to be transcribed into the patient chart.

*** At all stages, cross-check transcribed results for correctness.***

- **If the POCT device prints results:**
    i. Attach printout into patient chart.

- **If the POCT device results are interfaced to ICCA:**
    i. Results of Blood Gas in ICU & HDU are interfaced from Blood Gas Analyser to IntelliSpace Critical Care and Anaesthesia (ICCA) system.

6. DISPOSAL OF WASTE & SAMPLES

- Dispose of all sharps immediately after use
- Dispose of any POCT specimens in tubes/containers immediately after testing
- Any FBC samples removed from the laboratory for BNP testing must be returned to the laboratory for appropriate retention and storage.

MICROBIOLOGY

1. MICROBIOLOGY INTRODUCTION

1.1 Service Description

The Microbiology Department offers a range of diagnostic services in Microbiology. It is also involved in the reporting of notifiable diseases in conjunction with the Surveillance Department to the Health Protection Surveillance Centre (HPSC), Ireland's specialist agency for the surveillance and control of communicable diseases.

1.2 Contact Details

Location	Number
Microbiology Department	041 9837601 Extension 2101
Microbiology Covid / Molecular Laboratory	Extension 8451 COVID Testing / Molecular Lab 4851
Clinical Microbiology Team (Registrar/Consultant)	Via switch
Microbiology Medical Scientist On Call	Via switch

Table 29. ***Microbiology Contact Details***

In relation to contacting the microbiology, please note:

- The Microbiology Registrar, as part of the Clinical Laboratory Team, may be contacted for clinical advice. It is not always necessary to call the Consultant Microbiologist.
- The Microbiology on-call, scientist should be contacted via switch – no other lab phone.
- Avoid phoning the laboratory between 8am and 12 midday as samples are generally not logged in or results ready until after midday.
- If phoning the molecular laboratory, give staff time to answer phone as PPE must be removed before answering phones.

2. SPECIMEN COLLECTION

Microbiology results depend largely on the type and quality of the specimen received. Therefore they should be both representative and fresh for optimum results.

Where possible collect specimens before commencement of antimicrobial therapy. Please send an adequate amount of specimen. If a whole series of tests are required send sufficient samples and request forms for sputum, faeces, urines, fluids and CSF in particular. **Important to note: A delay in delivery of samples being received in the laboratory may affect the validity of results.**

2.1 Specimen Containers

Container Type	Specimen Type
Universal Container-Yellow Top 50mls	Faeces, sputa, joint, ascetic & pleural fluids, IV tips etc.
10mL Boric Acid urine monovette 3.5mL Yellow urine monovette	Urine for M, C & S Urine for Urinary Antigens
Transport Swab – Blue or Black top (contain transport medium – aimes or charcoal)	Collection of specimens from genital tract, wounds etc. (particularly appropriate where a time delay may occur)
Blood Culture Bottles Paediatric – yellow top Adult Aerobic – Blue Top Adult Anaerobic – Purple Top	Blood
Clear Plastic Tubes – 10ml Brown plastic tube – 10mls	CSF for C/S, Biochemistry Tests, Oligoclonal bands, virology CSF for Xanthochromia
Para-nasal swabs – Blue Top	Bordetella pertussis
Viral Swabs – Pink Top	Viral culture
Nasopharyngeal sample collection kit for Viruses	In house Influenzae testing/RSV/SARS-CoV-2
Chlamydia Aptima Kits	Adult urine or urethral swab, Endo-cervical or neonatal eye swabs

Table 30. ***Microbiology Specimen Containers***

3. MICROBIOLOGY TEST INDEX

3.1 Routine Microbiology Tests – GPs

For further details on microbiology testing carried out at Eurofins Biomnis, including specimen requirements and turnaround times, refer to the Eurofins Biomnis Microbiology Primary Sample Manual available at: https://cdnmedia.eurofins.com/european-west/media/12155439/microbiology-psm-web.pdf

3.2 Routine Microbiology Tests – In house

Note: Influenza/RSV/Covid testing is only available in line with current seasonal requirements, as communicated to users by the Microbiology department. Extended viral panels may be requested for high-risk patients by contacting the Clinical Microbiology Team.

Table 31. ***Microbiology Tests***

Specimen	Test	Specimen Volume/Type	Special Precautions	Turn Around Time
Abscess Fluid	C/S	Representative Sample	Transport immediately to the laboratory	4-5 working days
Abscess Swab	C/S	Transport Swab	-	4-6 working days
Anorectal Swab	GBS Screen/CPE, VRE	Transport Swab	Transport immediately to the laboratory	4-6 working days
Anorectal Swab/HVS/LVS	GBS Screen	Transport Swab	Transport immediately to the laboratory	4-6 working days
Arterial Line Tip	C/S	~ 4cm	-	4-6 working days
Ascites Fluid	C/S, Microscopy, Gram & Diff if indicated	2-5ml, more if multiple requests e.g. Biochemistry, Cytology	Transport immediately to the laboratory	4-5 working days
Aspirates: Bile/Duodenal/ Jejunal	Giardia	1ml into sterile container	Transport immediately to laboratory	3-4 working days
Broncho-alveolar Lavage	C/S, Gram	Total Sample	Transport immediately to the laboratory	4-5 working days
Bile Fluid	C/S, Gram	2-5ml	-	4-5 working days
Blood	C/S	<u>Paediatric</u> 1 ml (if possible) in a neonate ("paediatric bottle"), or up to 4ml per "paediatric" bottle <u>Adult</u> 5-10ml Anaerobic/Aerobic	Do not remove barcode labels from blood culture bottles. **Do not cover barcode with addressograph label.** Must be received in the laboratory within 3 hours.	5 Days Standard Negative, Variable if Positive
Bronchial Aspirate	C/S, Gram	Total Sample	-	4-5 working days
Bronchial Brushings	C/S, Gram	Total Sample	-	4-5 working days
Bronchial Washings	C/S, Gram	Total Sample	-	4-5 working days
Central Line Tip	C/S	~ 4cm	Send cannuale if evidence of infection. At least 2 blood cultures should be obtained when catheter infection is suspected by peripheral venepuncture	4-5 working days

Cerebrospinal Fluid (CSF)	C/S, Microscopy, Gram & Diff if required Xanthochromia Protein 14.33	3 numbered samples 10ml brown plastic tube	Minimum Volume: 1ml x 3 samples 1ml Biforme LP is performed, the patient Transmissible Spongiform encephalopathies form must be completed The ICP team must be notified before the specimen is taken.	4-5 working days Sent to Beaumont Hospital Sent to Neuropathology Laboratory, Beaumont Hospital
Cervical Swab	C/S, Gram and	Transport Swab	Inappropriate specimen pre puberty – take a vaginal swab	4-5 working days
Corneal Scrapings/ Intraocular fluids	Parasitology	Sterile container	Contact Consultant Microbiologist in advance	3-4 working days
CVP Line Tip	C/S	~ 4cm	Send cannuale if evidence of infection. At least 2 blood cultures should be obtained when catheter infection is suspected by peripheral venepuncture -	4-5 working days
Ear Swab	C/S	Transport Swab	-	4-6 working days

Specimen	Test	Specimen Volume/Type	Special Precautions	Turn Around Time
Endocervical swab	*Chlamydia trachomatis* *Trichomonas vaginalis* *N. gonorrhoeae*	Aptima Unisex swab kit	Aptima kits are available in Referrals Department	Sent to NVRL (7 days)
Endotracheal Tube	C/S,	Total Sample	-	4-6 working days
Eye Swab	C/S, *N. gonorrhoeae* in neonates	Transport swab	Please bring swab directly to Microbiology Department if *N. gonorrhoea* is suspected as recovery of gonococcus may be compromised if culture is delayed	4-6 working days
Eye Swab	Chlamydia trachomatis	Use special Aptima swab		Sent to NVRL (7 days)
Foetal Swab	C/S, GBSS	Transport swab	-	4-6 working days
Identification of Enteric Pathogens	C/S	Representative Sample	Do not overfill specimen container	4-5 working days
Faeces	Ova & Parasites (O/P) including Cryptosporidium / Giardia	Representative Sample	Relevant clinical details must be provided; A Cherry Orchard Request form must be complete and separate sample received.	Sent to Cherry Orchard / Eurofins Biomnis (7 days)

Faeces	Rotavirus/Adeno virus	Representative Sample	Must be loose stool and received in the laboratory	48 hours
Faeces	*H. pylori*	Representative sample	1-2g of stool in an appropriate sterile leak proof container. Temperature: 2-8°C up to 3 days or frozen immediately at ≤-20°C where processing or transport is delayed	Sent to Eurofins Biomnis (7 days)
Faeces	Occult blood	Representative sample	Must be received in the laboratory within 48 hours of sample being taken	48– 72 hours
Faeces	Reducing Substances	Liquid Stool	Must be a liquid stool	Sent to Eurofins Biomnis 7 days
Faeces	*C. difficile* Screen	Representative Sample of Loose Stool Only	Contact Microbiology in all urgent cases	24-36 hours

Specimen	Test	Specimen Volume/Type	Special Precautions	Turn Around Time
Hair	Fungal Culture, Microscopy	Representative Sample	-	Sent to St James 14-28 days
HCAI screens **Nasal/Groin swab (Add umbilical for Special care Nursery screen)** **Rectal swab (In house)**	MRSA CPE (Carbapenemase Producing Enterobacterales VRE (Vancomycin resistant Enterococci) Special care Nursery(*Pseudo monas aeruginosa*/CPE)	Transport swab Transport swab Transport swab Transport swab	Use *LF-MIC-0059 Surveillance Screening Request Form*	24-72 hours

Specimen	Test	Specimen Volume/Type	Special Precautions	Turn Around Time
HVS	C/S, Gram Stain, Hay's Grading, GBS	Transport Swab	It is important to avoid contamination with faecal flora during collection of specimens	4-5 working days
Joint Aspirate	C/S, Microscopy, Crystals, Gram & Differential Cell Count if required	2-5ml	Transport immediately to the laboratory	4-6 working days
Mouth Swab	C/S, Gram stain, if required	Transport Swab	-	4-6 working days
Nail Clippings	Fungal Culture, Microscopy	Representative Sample	-	Sent to St. James' 14-35 days
Nasal Swab	C/S	Transport Swab	-	4-6 working days
Nasopharyngeal swab	Influenza/RSV PCR SARS-CoV-2 PCR	Nasopharyngeal collection kit Nasopharyngeal collection kit	Ensure lid is tightly capped.	24 hours. 24 hours
PCR for: Meningococci, Pneumococci, *H. influenzae* GBS	Meningococcal PCR	4ml EDTA, 1ml CSF	PCR Request Form required (available online)	Referred to IMMRL, Temple St Up to 7 days
Perineal Swab	C/S	Transport Swab	-	4-6 working days
Pernasal Swab Query Pertussis	*Bordetella pertussis* culture & PCR	Use Per-nasal Swab	Do not use ordinary transport swab, use Para-nasal swabs – Blue Top	5-10 days Referred to OLCH, Crumlin
Pernasal Swab Query Meningococcal Infection	C/S	Use Nasal, Per-nasal and Oropharyngeal Swab	Use transport swab with charcoal. Transport to the laboratory asap as recovery of meningococci may be compromised if culture is delayed	4-6 working days
Placental Swab	C/S, GBS	Transport Swab	-	4-6 working days
Pleural Fluid	C/S, Cell Count, Gram & Diff if required	2-5ml	-	4-5 working days
Pus	C/S, Gram	Representative Sample	-	4-5 working days
Skin Scrapings	Fungal Culture, Microscopy	Representative Sample	-	Sent to St. James 14-28 days
Skin Scrapings for Microscopy – Query Meningococcal	Gram	Skin scrapings on glass slide	Transport in suitable sealed slide container and bring directly to the Microbiology	8 hours

Specimen	Test	Specimen Volume/Type	Special Precautions	Turn Around Time
Sputum	C/S	Representative Sample	Must be from deep in the lungs, salivary samples not accepted	4-6 working days
Sputum	Mycobacteria	Representative Sample	Please see TB Guidelines below	Sent to IMRL, St James' Up to 8 weeks
Throat Swab	C/S	Transport Swab	-	4-6 working days
Tissue to include bone, biopsy, joint prosthesis & bone marrow	C/S, Gram	Representative Sample	-	4-6 working days
Umbilical Cord Swab	C/S	Transport Swab	-	48-96 hours
Urethral Swab	C/S, Gram	Transport Swab	Please bring directly to Microbiology *if N gonorrhoeae* is suspected as recovery of gonococcus may be compromised if culture is delayed	4-6 working days
Urethral swab (male)	Chlamydia trachomatis *N.gonnorrhoeae*	Aptima Unisex swab kit	Aptima kits available from Referrals Dept.	Sent to NVRL Up to 7 days
Urine	*Chlamydia trachomatis Trichomonas vaginalis N.gonnorrhoeae*	Aliquot of first void specimen	Aptima kits available from Referrals Dept	Sent to NVRL Up to 7 days
Urine	C/S, Microscopy,	10mL Representative mid-stream sample	-	Microscopy: 48 hours Culture: 3-4 working days
Urine	Asymptomatic Bacteruria Screening (Maternity)	10mL Representative mid-stream sample	-	Culture: 3-4 working days
Urine	Pneumococcal and Legionella Antigen	10mL Representative Sample	-	48 hours
Urine	Schistosoma	Collect at least 10mls into sterile container between 10:00hrs and 14:00hrs or 24hr urine. Pass most of the urine and collect the final part of the urine.		Sent to Eurofins Biomnis (up to 7 working days)
Urinary Catheter	Unsuitable Specimen	-	Not processed	-
Vaginal Swab	C/S, Gram stain, Hay's criteria	Transport Swab	It is important to avoid contamination with faecal	4-5 working days

			flora during collection of specimens	
Specimen	**Test**	**Specimen Volume/Type**	**Special Precautions**	**Turn Around Time**
Vulval Swab	C/S, Gram stain	Transport Swab	It is important to avoid contamination with faecal flora during collection of specimens	4-5 working days
Wound Swab	C/S	Transport Swab	Transport immediately to the laboratory	4-6 working days

3.3 Out of Hours Microbiology Tests

TEST	REQUIREMENTS
Blood Culture Examination	Samples must be received in the lab within 3 hours of specimen collection.
CSF Examination	Samples must be delivered by hand. The medical scientist on-call must be contacted and notified of sample.
Culture & Sensitivity Testing on Fluids	Specific Requests only The medical scientist on-call must be contacted and notified of sample.
Legionella- Urinary Antigen **Strep. Pneumoniae- Urinary Antigen**	ICU/HDU and specific requests only The medical scientist on-call must be contacted and notified of sample.
Paediatric Urines **Microscopy and culture**	Specific Requests only The medical scientist on-call must be contacted and notified of sample.
HCAI Screening **(include CPE,VRE,MRSA,SCNS)**	All Samples from HD areas, outbreak wards and specific requests Sat & Sun and out of hours Mon-Fri.
Investigation for *Clostridium difficle*	Run Daily Sat & Sun and on specific requests from Consultant Microbiologist at any time.
ICU/HDU/SCBU Samples	All samples up to 8pm 7/7
Influenza/RSV Testing	A specific request from Consultant Microbiologist at any time
SARS-CoV-2 PCR	Majority of samples are run in batches. For more urgent testing, contact the Consultant Microbiologist.

Table 32. ***Out of Hours Microbiology Tests***

4. SAMPLE ACCEPTANCE/REJECTION

As discussed in the general section 6.13 Sample Acceptance/Rejection Policy, above, the Haematology department is similar to other departments re Sample Labelling Acceptance Criteria

Specimen	Request Form	Specimen or Request Form
• Full Name (No abbreviations) • Date of Birth or MRN	• Full Name (no abbreviations) • Date of Birth or MRN • Requesting Clinician (Consultant/GP) • Test request	• Date of specimen collection • Time of specimen collection • Source

Table 33. ***Microbiology Sample Acceptance Criteria***

All of the above information **MUST:**

- be supplied
- be identical if present on both the specimen and request form
- be legible

Samples are rejected in the following circumstances

- Do not meet the Sample Labelling Acceptance Criteria
- Leaking specimens
- Incorrect/Insufficient specimen for test requested
- Specimen tube out of date

An additional request form is required if extra tests are requested on a sample which has already been received in the laboratory.

The use of labels for both specimen and request form is encouraged

5. SPECIMEN RETENTION TIME

The retention times for Microbiology specimens are listed below. Occasionally additional analyses may be required e.g. viral studies on a CSF, but may not always be possible due to the specimen processing procedure in Microbiology. In all cases please contact the microbiology department for advice.

Sample Type	Retention Time
CSF	1 month
Fluids & Tissues	1 month
Positive Blood Cultures	1 week Significant isolates are held frozen 1 year
Significant Culture Plates	7 days
Sputum	7 days
Swabs	7days
Nasopharyngeal swabs in UTM	Negative samples kept 24h Positive samples CT >25 kept 24h Positive samples CT <25 frozen for 1 month
Urines	<2 days

Table 34. ***Specimen Retention Time***

All EARSS isolates and others deemed clinically significant are frozen and kept indefinitely.

6. COMMUNICATION OF CRITICAL RESULTS

Critical Microbiology results, even if preliminary, are communicated by the Medical Scientist to the Clinical Microbiology Team or, where appropriate, to the attending clinician. Refer to *LI-MIC-0085 Communication of Significant Results in Microbiology.*

Table 35, below, lists critical results and turnaround times for the Microbiology Department and to whom these results are telephoned/communicated to. Please note, this list is not exhaustive.

All telephoned results, attempts to telephone results, and in-laboratory communication of results are recorded on the Winpath Laboratory Information System (LIS) Telephone Log.

Result[1,2,*]	TAT[3,4]	IPCT	Phoned to Clinical Microbiology Team 08:00 to 20:00	Significant isolates/BC Logbooks	Communicated to Ward/On-Call Team 20:00 to 08:00
Positive Gram stain blood culture	**2 hours[3]**	**N/A**	**√**	**√**	**√**
All positive CSF results	**2 hours**	**N/A**	**√ 24/7**	**√**	
Positive Gram stain / Cell Count on Sterile fluids / tissue	**4 hours**	**N/A**	**√**	**√**	**√**
Invasive *Streptococcus pyogenes* (e.g., Blood, joint aspirate, pleural, peritoneal fluid)	**2 hours[3]**	**√**	**√ 24/7**	**√**	**N/A**
Listeria sp. (blood/stool/CSF/HVS)	**2 hours[3]**	**√**	**√ 24/7**	**√**	**N/A**
CPE*	**2 hours[3] Lab rounds[4]**	**√**	**√**	**√**	**N/A**
C. difficile Positive	**2 hours[3]**	**√**	**√**	**√**	**N/A**
Positive enteric PCR/Culture results	**Same Day[3]**	**√**	**√**	**√**	**N/A**
MDRO such as AmpC/VRE/ESBL/MRSA/ NICU positive SCNS (New Isolates)	**Same Day[3] Lab rounds[4]**	**√**	**√ (Out of hours, inpatients only)**	**√**	**N/A**
GBS excluding blood culture (first isolate) from maternity/NICU patients	**Same day[3] lab rounds[4]**	**N/A**	**N/A**	**N/A**	**√ 08:00 – 20:00**
MDR e.g. VISA/GISA, Dapto Res, Linez Res	**2 hours[3] lab rounds[4]**	**√**	**√**	**√**	**N/A**
Positive Pneumococcal/Legionella Ag	**2 hours[3]**	**N/A**	**√**	**√**	**√**

Result[1,2,*]	TAT[3,4]	IPCT	Phoned to Clinical Microbiology Team 08:00 to 20:00	Significant isolates/BC Logbooks	Communicated to Ward/On-Call Team 20:00 to 08:00
Adenovirus & Rotavirus	**Same day[3] lab rounds[4]**	**√**	**N/A**	**√**	**√**
New *Burkholderia cepacia*/complex	**Same day[3] lab rounds[4]**	**N/A**	**√**	**√**	**N/A**
Positive AFB from IMRL[1]	**Same day[3]**	**√**	**√**	**√**	**N/A**
Referral Laboratory significant results[2]	**Same day[4]**	**N/A**	**√**	**√**	**N/A**
Influenzae A&B/RSV	**2 hours**	√	**√**	**√**	**√**
SARS-CoV-2 – urgent GX requests only	**2 hours**	**N/A**	**√ (non-ED Only) (CNM ED all ED results)**	**√ (out of hours only)**	**√ ADON non-ED CNM ED-ED**
Positive Meningococcal PCR	**2 hours[3]**	**N/A**	**√ (24/7)**	**√**	**√**
*N. meningitidis** and *N. gonorrhoeae**	2 hours* **/ Same day[3] lab rounds[4]**	**N/A**	**√ (24/7)** (*N.meningitidis* only)	**√**	**N/A**

Table. 35 Microbiology Critical Results and Turnaround times

[1] The IPCT is only telephoned with positive AFB microscopy results (1st occurrence). The SpR/CM is telephoned with each stage of a TB result.

[2] Further VTEC results from COH are not telephoned to the SpR/CM or IPCT, but are recorded in the laboratory in LF-MIC-0003 Microbiology Significant Results Log.

[3] From the time the associated result is available, i.e. from time culture is read/ Positive Blood culture sub-cultured etc.

[4]Consultant Microbiologist lab rounds at 11-12am results may be communicated then for Isolates from the morning culture reading, verbal preliminary results may be given at this time.

* Results are telephoned even at the presumptive stage i.e. when a suspicious culture is noted by the Medical Scientist.

Note: It is the responsibility of the IPCT to contact the CM if a query arises as to the status (either colonisation or infection) of a result of e.g. MRSA or a positive *C. difficile* test. The results are telephoned from 8am to 8pm to either the ICPT and/or SpR/CM as appropriate, unless there has been a specific request by clinicians to have the results telephoned to them directly or that telephoning the CM will cause a delay. The SpR/CM telephone the results to members of the clinical team and review the patient as required on the wards to advise on further management. The SpR/CM must document the clinical liaison in the patient's Clinical Notepad on Winpath. Blood cultures must be documented in the Blood Culture Book *ED-MIC-0429 Blood Culture Clinical Notebook.*

7. SUSCEPTIBILITY REPORTING AND DEFINITION

The definitions used to categorise organisms as susceptible, intermediate or resistant are defined below:

- **S - Susceptible,** standard dosing regimen: A microorganism is categorised as "Susceptible, standard dosing regimen", when there is a high likelihood of therapeutic success using a standard dosing regimen of the agent.
- **S* – Susceptible, increased exposure***: A microorganism is categorised as "Susceptible, Increased exposure*" when there is a high likelihood of therapeutic success because exposure to the agent is increased by adjusting the dosing regimen or by its concentration at the site of infection.
- **R - Resistant:** A microorganism is categorised as "Resistant" when there is a high likelihood of therapeutic failure even when there is increased exposure.

*Exposure is a function of how the mode of administration, dose, dosing interval, infusion time, as well as distribution and excretion of the antimicrobial agent will influence the infecting organism at the site of infection.

Further information is available on dosing and regimes are available upon discussion with the clinical microbiology team

(Ref: The European Committee on Antimicrobial Susceptibility Testing - EUCAST https://www.eucast.org/newsiandr/)

8. URINE MICROSCOPY REPORTING

Please note the changes to reporting of Urine microscopy and the criteria for performing urine culture as follows.

Urine Microscopy - Cell counts will be banded into categories instead of the current practice of reporting the exact count (see table below for categories)

WBC (/µL)	Nil	<10	10-50	50-100	100-1000	>1000
RBC (/µL)	Nil	<10	10-50	50-100	100-1000	>1000

Urine Culture

Urine samples with <10 WBC / µL and/or “scanty” bacteria counts will no longer be cultured*. The following comment will be added to the report:

- **Absence of pyuria / bacteria. Culture NOT indicated**

* Urines from antenatal, paediatric, oncology or urology patients will still be cultured regardless of white cell count.

HISTOPATHOLOGY

1. HISTOLOGY INTRODUCTION

1.1 Service Description

The Histopathology Laboratory is the central Histopathology Laboratory servicing Louth County Hospital Dundalk, Our Lady of Lourdes Hospital Drogheda and General Practitioners in the Louth/Meath area. In addition, a referral service for more specialised histopathology tests is provided.

Continual efforts are made to ensure a printed final report reaches the correct destination however it is the responsibility of the requesting Clinician to follow up on the result

1.2 Contact Details

If phoning from outside hospital (041) 9837601

Location	Number
Histology Main Laboratory	Ext. 2331/2314
Histology Cut Up Room	Ext.2315
Histology Reports	ext. 4661/2482/2615
Consultant Histopathologist **Dr. Ruth Law**	6694
Consultant Histopathologist **Dr. Jane Thorne**	2698
Consultant Histopathologist **Dr. Brianan McGovern**	2328
Consultant Histopathologist **Dr. Peter Szontagh-Kishazi**	2411
Consultant Histopathologist **Dr Eduardo Gavin**	6830
Histopathology Registrars Room	2540

Table 36. ***Histology Contact Details***

2. HISTOPATHOLOGY TEST INDEX

2.1 Routine Histopathology

Routine Histopathology**
Surgical Histology
Special Stains
Immunohistochemistry
Non Gynaecology Cytology
Frozen Sections
Post Mortem Histology

Table 37*. Routine Histology Tests*

2.2 Referred Histopathology

All referred histopathology is either referred by the Consultant Histopathologist or the Consultant Oncologist only.

Test	Destination	Specimen Type
Molecular Histopathology This list is subject to change** • K-RAS • MSI • EGFR • FISH • HER2 • PR • ER • DOG 1 • ALK Translocation Gene • Kit Gene Sequencing • ROS1 Gene • C-Kit Mutation • PDL1	Beaumont Hospital	Routine Histology Block (Formalin Fixed, Paraffin Embedded Specimen)
Occasional Immunohisto-chemistry Stains not done in house.	Approved Histopathology Department e.g. Beaumont	Unstained Slides
Occasional Special Stains not done in house	Approved Histopathology Department e.g. Beaumont	Unstained Slides
Direct Immunofluorescence (DIFS)	Dr Niall Mulligan, Histopathology, Mater Hospital,	Fresh skin punch snap frozen
2nd Opinion/Peer review/MDT	LI-HIST-0003Approved List of Consultants	Routine Histology Block Slides

Table 38. ***Referred Histology Test Details***

Please note; this is not a definitive list. Subject to change

3. SAMPLE REQUIREMENTS

3.1 Handling and Transportation of Samples

To protect the safety of healthcare staff, the following precautions for the transportation of samples must be followed:

- Sample containers must be sealed correctly. Ensure that screw caps are fully closed and the lids on buckets are properly sealed. Formalin is a solution of the chemical compound formaldehyde which is a potent eye and nasal irritant; it has the potential to cause respiratory distress and allergic dermatitis. In case of a spillage please follow formaldehyde

chemical spill guidelines. If no guidelines are available please contact the Histopathology Laboratory for instructions.

- Samples must be placed in a biohazard bag (where size allows) and the accompanying form placed in the designated pouch.
- Samples must be hand delivered to the clearly identifiable **Histology Specimen Reception** which is a separate entity to the Main Laboratory Specimen reception.
- All urgent histology specimens must be handed-directly to a member of staff in the Histopathology Laboratory.

3.2 Sample Types for Histopathology

- Samples for routine Histopathology (with the exception of Frozen Sections, Skin DIF'S and Non-Gynae Cytology Samples) must be fixed in formalin.
- Pre-filled 40 ml/250ml/350mls 10% neutral buffered formalin pots and 10L formalin polycubes are available in the formalin storage area of the laboratory.
- Smaller 40ml (red-lidded) pots are used for smaller samples such as biopsies or skin punches/tags, nevus's etc. The larger containers/buckets are used for larger specimens such as placenta, colon or small bowel etc. 2.5 and 5 litre buckets are available from Histopathology.
- An adequate volume of formalin in a specimen container of suitable size is essential for proper fixation. The volume of formalin used should be at least twice the volume of the tissue to be fixed.
- Samples should be clearly labelled with at least 2 critical identifiers patient and specimen details. The requesting clinician must also be identified. The Clinician stated on the request form receives report. For correct report destination the Clinicians name must be legible. For larger containers this information should be on both the lid and the side of the container.

All urgent samples should be clearly marked on the request form.

3.3 Turnaround Times for Routine & Urgent Histopathology

Sample Type	Turnaround Time^^
Small Samples and Non-Gynae Cytology P01, P02, P06, P07.	<12 working days
Larger Samples P03, P04	<12 working days
Case may be referred for 2nd opinion/special stains or Immunocytochemistry which adds to the TAT**	
Urgent Samples	24-36 hours
Frozen Sections	20 mins initial report Final Report 2 days
Consultant Pathologists are happy to discuss reports at any stage	

Table 39. ***TAT Histology***

^^ Histology TAT's are monitored in conjunction with the NQAIS national programme.

****A Histology preliminary report will be issued if the sample has been sent out for further testing or second opinion.**

3.4 Skin for Direct Immunofluorescence (DIF) Special Requirements

- Specimens for DIF must be received **fresh**, wrap the fresh tissue in moist saline gauze and place this sample in a sterile/dry container.
- Ensure the cap is securely tightened.
- Container must be labelled with an addressograph label and nature of the specimen.
- The histopathology form must be correctly labelled with full patient details including comprehensive clinical details and the time the specimen was taken. And the requesting clinician.
- The sample must be delivered ASAP and handed directly to a member of the histopathology staff.

Due to the nature of the work involved in handling DIF samples, DIF's cannot be accepted later than 16:00pm in the histopathology laboratory. DIFs arriving later than 4 can still be facilitated however the lab should be informed as soon as possible via a phone call

3.5 Frozen Sections Special Requirements

- Frozen sections must be pre-booked with the Histopathology Laboratory at Ext 2331.
- The scientific staff answering the call will check that a Consultant Pathologist is available at the stated time before confirming the booking.
- Please contact the Histopathology Laboratory again on the day of surgery to confirm if the frozen section is going ahead.
- Samples must be sent fresh in a dry/sterile appropriately labelled container.
- Please write a contact number on the request form for the telephoned report.

3.6 Non-Gynae Cytology Special Requirements

- Fluid Cytology samples (such as **Urine, Serous Effusions, Bronchiolar Lavage BAL's, Bronchial Washings** etc.) should be sent to the Histopathology laboratory **without** any formalin fixative being added.
- Bronchial brushings are placed directly into an appropriately labelled PreservCyt pot.
- Fine Needle Aspirates are received pre-made on slides clearly labelled with the patient's details in pencil as either Air-Dried (AD) of Spray Fixed (SF). While the remaining fluid in the needle is washed into an appropriately labelled CytoLyt pot. (**Note:** if using a needle gauge likely to result in a solid needle biopsy it is preferable to place the biopsy directly into a formalin pot.)

- Separate samples must be submitted if Biochemistry and Microbiology is also required.
- Cytology samples should not be received outside of normal working hours due to the capricious/unfixed nature of the specimens.

3.7 Muscle Biopsies Special Requirements

- **Must be pre-booked** with the Histology Laboratory due to the nature of the procedure/specimen and the transport arrangements required to maintain the integrity of the specimen.
- The person contacting the laboratory must give their own name and bleep number, the patient name, date of birth and the name of the consultant.
- The biopsy must be arranged in time to allow the sample to get to the Neuropathology Laboratory, Beaumont Hospital, Dublin in a timely manner within routine hours.
- The biopsy must be placed on saline-moistened gauze and placed in a dry universal container. (Do not use too much saline)
- Never squeeze a biopsy into a tight or narrow necked specimen container.
- Please contact the laboratory if the procedure has been cancelled.
- Deliver the appropriately labelled specimen to the laboratory immediately.

3.8 Post Mortem/Autopsy

Please contact the Consultant Pathologists directly regarding Post Mortems Procedures and Policies.

3.9 Placenta Pathology

The indications for examination of placentas in OLOL or referral of placentas to the Rotunda Hospital Dublin can be found on the main hospital Q-Pulse. *LF-HIST-0085 Placenta Histopathology Form* must be used for all requests.

4. SAMPLE ACCEPTANCE/REJECTION

As discussed in the general section 6.13 Sample Acceptance/Rejection Policy, above, the Histology department is similar to other departments re Sample Labelling Acceptance Criteria.

Specimen	Request Form	Specimen or Request Form
• Full Name (No abbreviations) • Date of Birth or MRN • Specimen Type (if multiple specimens) • Right or Left	• **Full Name (No abbreviations)** • **Date of Birth or MRN** • Source • Patient Address • Requesting Consultant/GP	• Date of specimen collection • Specimen Type • Right or Left (if relevant)

(if multiple specimens)	• Clinical details (if relevant) • Test request	

Table 40. ***Histology Sample Acceptance Criteria***

The Clinician stated on the request form receives report. For correct report destination the Clinicians name must be legible.

Because of the nature of Histology samples, no samples are discarded. If any of the above information requires amendment, proceed as follows:

The Full Name (no abbreviations) and Date of Birth or MRN are essential on both the specimen and request form.

- If there is a **Minor** discrepancy e.g. incorrect year in the date of birth, the requesting clinician will be contacted to obtain the correct details. The corrections will be documented on *QF-HIST-0059 Sample Correction Form.* The clinician may not be required to attend the laboratory to sign this form. The specimen may be processed at the discretion of the Pathologist.
- If there is a **Major** discrepancy between the two critical identifiers on the specimen container and the request form or the specimen arrives in the department unlabelled or if we are informed that the specimen does not belong to the patient. The details will be documented on *QF-HIST-0060 Histology Sample Amendment Form*. *LI-HIST-0072 Process Flow for unlabelled or incorrectly labelled samples in Histology* will be followed. **The sample will not be processed until the process flow has been completed.**
  An incident will also be escalated to the Quality and Risk department and recorded on Q-pulse.

- The completed *QF-HIST-0059 Sample Correction Form* and *QF-HIST-0060 Histology Sample Amendment Form* are filed in the Cut-Up Room in date order.

5. SAMPLE RETENTION

SAMPLE	RETENTION TIME
Routine Histology Specimens	4 Weeks
Cytology Specimens	4 Weeks
Autopsy Specimens	Until Final Report is Issued

Table 41. ***Histology Sample Retention***

All histology specimens are retained for a minimum of 4 weeks after cut-up, a verification check is then complete, any cases still incomplete are not disposed until authorised. See *LP-HIST-0011 Procedure for the Disposal of Chemicals and Anatomical Waste in Histology.*

Some samples may be retained for longer periods at the request of the reporting pathologist and with the consent of the patient/next of kin where required.

6. COMMUNICATION OF CRITICAL RESULTS

The following cases are phoned to the responsible consultant or a member of the team or any other relevant person.

- Unexpected diagnoses of malignancy
- Discovery of a major discrepancy in diagnosis
- Significant micro-organisms or infections e.g. mycobacteria
- Absence of villi in Products of Conception (Obstetric Registrar on-call, bleep 418)
- Positive temporal artery biopsies
- Urgent cases
- Cases that have immediate clinical consequences
- Amended report with a significant change of result.

'Unexpected' is defined in this policy as any significant pathology/condition about which the clinician appears to be unaware. Assessment of clinician awareness by Consultant Histopathologists can only be based on the clinical information provided on the histology request card.
'Significant Pathology' is broadly defined in this policy as any serious condition requiring urgent action by the clinician.

REFERRAL TESTS

1. REFERRALS INTRODUCTION

Tests that are not processed on-site in Our Lady of Lourdes Hospital are referred to selected referral laboratories. For information in relation to referral tests and associated sample requirements, contact the Referral Department at 2560.

The majority of referral tests should be requested on the "Other Tests" section of *LF-GEN-0035 Blood Sciences Request Form*.

Genetic tests and other tests such as Quantiferon require completion of specific forms depending on the referral laboratory used. Laboratory staff cannot transcribe forms.

Sufficient specimens **must** be provided for referral tests as multiple tests requests may be sent to different laboratories. It is not feasible to use specimens already provided to the Biochemistry/Haematology Department for other tests as these specimens are retained in that department for a specified period of time should retesting be required. It is not safe practice to split specimens from the original container.

Samples for Referral Laboratories are dispatched each morning at 09:00am Monday to Friday. If testing is required urgently, Specimen Referrals should be contacted during normal working hours to discuss the feasibility of the request. If the Referral Laboratory can accommodate the request, laboratory personnel will arrange transport and dispatch of samples.

It is not possible to add an additional test request to a sample which has already been dispatched to a referral laboratory.

2. REFERRED TESTS

Tests referred from Our Lady of Lourdes Hospital Drogheda including Sample Types, Volumes and Special Requirements are listed in Table 42, below.

Table 42. Tests Referred from Our Lady of Lourdes Hospital Drogheda and Sample Types, Volumes and Special Requirements. *(Ref. LMN-REF-0001 version 4, effective 23/02/2023)*

Test	Samples Type & Volumes	Special Requirements/Information
16S RNA	EDTA Tissue Fluid	EDTA X 2
17 Hydroxy Progesterone (17OHP) Adult	Serum Lithium Heparin	Paediatrics ONLY Spin & Freeze Not relevant in for children <3 days old due to maternal hormones
21 Hydroxlase	Serum	Part of Ovarian Antibodies screen. SJH refer to Herries Road.
Free Androgen Index FAI	Serum 24HR acidified Urine (Adult) Spot Urine (Paeds)	Serum Spin and Freeze 24 hour Acidified urine to be refrigerated on arrival Paeds Spot Urine: Add 0.5ml HCL per 10ml in <1hour. The PH must be 4.0 Dietary restrictions (LI-GEN-0016): 48 prior avoid consuming bananas, chocolate, dried fruit, citrus fruits, avocados, tomatoes, plums, kiwis, pineapples and molluscs. Includes Urinary Creat, VMA and 5-HIAA.
Acyl Carnitine (Includes Free Carnitine Screen)	Blood spot or Lithium heparin on Guthrie Card	Only URGENT samples sent to Metabolic Temple street pre-arranged by Consultant. All developments delays and query autism sent to Biomnis Must be air dried for minimum 2 hours
Adalimumab	Serum	White Top Tube Request form must state Trough / Peak.
ADAMTS-13 Activity Assay Thrombotic Thrombocytopenic Purpura (TTP)	Sodium Citrate x 2	**This test needs Haematology approval** Must be received in Belfast **<4hours** otherwise Spin & Freeze into x2 0.5ml aliquots **FREEZE at -70** and refer on **DRY ICE** Requires special request form **Contact referring laboratory before sending. Tel: 028 95040910.** Dry ice can be arranged with Biomnis
Adenovirus	BAL Stool Throat Swab CSF Urine Plasma Serum	EDTA sample spin & freeze for PCR
Adrenal Antibodies ADRA	Serum x2	Associated in Patients with Addison's Disease Also in Patients with Autoimmune Polyglandular Syndrome
Adrenocorticotropic Hormone ACTH	EDTA	Spin & Freeze Adult Cortisol levels to be checked in Winpath and only refer out if cortisol >500nmol/L. Paeds levels automatically sent out.
Autoimmune Neutropenia	Serum	Histocompatibility and Immunogenetics Form (Bristol Filton) must be filled out before processing

Test	Samples Type & Volumes	Special Requirements/Information
Alcohol Ethanol	Fluoride Oxalate Spot Urine	Samples must be taken within 24 hours of ingestion
Aldosterone	EDTA 24 Hour Plain Urine	Spin & Freeze EDTA x2 samples 20 ml aliquot Plain 24 hour urine collection FREEZE sample Ensure to note total volume of 24hr container on request form
Alpha-1 Antitrypsin	Serum	NONE
Alpha-1 Antitrypsin Phenotype	Serum	NONE
TAU Protein Amyloid Beta 1-42	CSF	This is a screen for Alzheimer's/ Dementia 500µl unhaemolysed - CSF in PLASTIC tubes Centrifuge CSF @3,000 RPM for 10 minutes and transfer into 2 polypropylene tubes (Sarstedt serum tubes) and store at -40oC and transfer to UK on Dry Ice (Biomnis will arrange).
TAU Protein / Amyloid Beta 1-42	EDTA & Lithium Heparin	This is a screen for Alzheimer's/ Dementia 6ml EDTA & 6ml Lithium Heparin Please Ensure the Pre-Labelled Kit is used, Kits are available in Referrals Dept (Box folder) Further kits available from Sanofi Genzyme **Females** tick DNA analysis **Males** tick Anderson-Fabry diagnosis Sample needs to be referred to London <96 hours
AMH Anti -Mullerian Hormone	Serum	NONE
Amikacin Drug Levels	Serum	NONE
Amino Acids	Lithium Heparin Serum Urine CSF (12A only)	**Please note: Clinical Details must be provided Only urgent samples sent to Temple street when confirmed by consultant. All developmental delay or query autism sent to Biomnis** Lithium Heparin Spin and Freeze Urine 5mls freeze CSF must be paired with plasma and must be approved by Consultant Microbiologist. Urine AA will only be performed if clinically warranted i.e. tublopathy, stone formation or suspected cystinuria. Test type 'Tremor AA' should be highlighted and phoned to Temple St Hospital

Test	Samples Type & Volumes	Special Requirements/Information
Aminophylline Theophylline	Serum	White top tube
Amphetamine	Spot Urine	Part of drugs screen. Qualitative Test Only (Positive/Not Detected)
Amyloid Antibodies Protein Serum Amyloid A (SAA)	Serum	Store at Room Temperature (Ambient)
Free Androgen Index FAI	Serum	NONE
Androstenedione	Serum	NONE
ACE Angiotensin Converting Enzyme	Serum CSF	Serum: Spin & freeze CSF: Spin, separate supernatant & freeze
Antenatal Screen Booking Blood Serology	Serum	Includes: Hep B, Hep C, Tpha, HIV, Rubella and Varicella Zoster Virus
Anti-Basement Membrane Antibodies	Serum	NONE
CCP Anti-CCP Anti Cyclic Citrulline Antibodies Cyclic Citrullinated Peptide Antibodies	Serum	Test used to monitor/aide RF Diagnosis and Prognostic of RA joint Damage
Anti-Histone Antibodies	Serum	White Top Tube Seen in drug induced Lupus, Felty's syndrome and or Juvenile chronic arthritis
Anti-Muscarinic ABS (M3R) Anti MUSK	Serum	NONE
Anti-Nuclear Antibodies ANA	Serum	ANA's >1:160 (positive) then dsDNA is performed. If ANA positive then LKMa and Titre / Pattern are performed. Also known as Scleroderma allergies.
Anti-Platelet Antibodies	Serum	Alloantibodies to Platelets Form available in Referrals in the Request Folder, sent to NHIRL in the IBTS
Anti-Proteinase 3 PR3	Serum	Only performed if ANCA is positive.
Anti-Diuretic Hormone ADH Arginine Vasopressin Levels	24 Hr Urine Plain Aprotinin tube	24 Hour Urine plain collection Frozen (see Biomnis online Tests Guide) Aprotinin Tube: Spin and freeze Aprotinin tubes available in Referrals ONLY (short shelf life)
Aquaporin 4 AQP4; Anti-Neuromyelitis Optica Antibodies; NMO	Serum Plasma CSF	Aquaporin 4 (AQP4) may also be requested Plasma is acceptable for this CSF not required

Test	Samples Type & Volumes	Special Requirements/Information
ANCA Anti-Nuclear Cytoplasmic Antibodies Anti Granulocytes Antibodies	Serum	Includes Anti MPO and PR3ANCA part of Vasculitis Screen not specific for Vasculitis, it is seen in other inflammatory disorders
Anti-Thrombin III	Citrate	Part of Thrombophilia screen
Apolipoprotein A1 and B1	Serum	NONE
Arbovirus	Serum	**If delays >72 hours, spin and freeze** Clinical Details and Travel Details essential. Yellow Fever Vaccine information required 2 screens: US Panel - Contact NVRL Non-USA Panel Includes: Japanese Encephalitis, West Nile, Dengue, Yellow Fever, Venezuelan Equine Encephalitis
Arsenic	Urine Hair Lithium Heparin	10ml Urine Hair to be sent ambient 3ml Lithium Heparin
ASOT Anti-Streptolysin O Titres	Serum	Increased in Patients with Group A Strep Skin Infections
Aspergillus Titres	Serum	NONE
Astroviruses (Norovirus)	Stool 2-5g	Gastroenteritis screen
Atypical Pneumonia Screen	Serum Urine Bronchial Lavage Nasopharngeal Aspirate	NONE
Autoimmune Encephalitis Screen	CSF Serum	**Test Includes; AMPA**(α-amino-3-hydroxy-5-methyl-4-isoxazol-propionic acid), **$GABA_B$** (γ-amino-butyric acid), **DPPX** (dipeptidyl amino peroxidase like protein 6), **LGI1** (Leucine-rich glioma inactivated protein 1), **CASPR2** (Contactin- associated protein 2) **NMDA (**N-methyl-D-aspartate)
Avian Antibodies	Serum	To assess immunological reactivity to avian antigens in the assessment of possible extrinsic allergic alveolitis.
Vitamin B1 Thiamine	EDTA	Protect from light- wrap sample in tin foil & freeze whole
Barbiturates	Serum Urine	White Top Tube Qualitative Test Only (Pos or Neg)

Test	Samples Type & Volumes	Special Requirements/Information
Bartonella Antibodies Cat Scratch	Serum	10ml Serum required Needs Approval from the Consultant Microbiologist If negative then it requires a repeat in 2-3 weeks if clinically indicated
BCR- ABL	Bone Marrow in RPMI EDTA	EDTA: 9mls BMA: 9mls **MUST be in CMD <24 hours (DNA degrades)** Breakpoint Cluster Region- Abelson gene
Bence Jones Protein Urine Protein Electrophoresis	24 hr Urine Spot Urine	**Not Available to GP's** Early morning urine sample is ideal. Ensure the total volume has been stated before aliquoting into Sarstedt Tube
Benzodiazepine Benzamazapine Benzo's	Urine Serum	Serum White Top Qualitative Test Only (Pos or Neg)
Beta 2 Glycoprotein Antibodies ß2GP1AB's	Serum	Cardiolipin Antibodies and Beta 2 Glycoprotein make up Phosolipid Antibodies
Beta 2 Microglobulin ß2MG	Serum	Increased in Multiple Myeloma, Lymphoma, HIV or Renal Impairment also used to monitor Tumour Burden
Beta 2 Transferrin	Fluid (Oral/Nasal/Other) + Serum	Serum: Spin & Freeze Test requires a serum sample, to exclude any serum fraction of beta-2-transferrin, and a body fluid sample, such as oral discharge, nasal discharge or other.
Beta D Glucan	Serum Aspirate	NONE
Beta Glucosidase Activity - see MPS enzyme assay	EDTA	MPS IVB, Moriquio syndrome and GM1- gangliosidosis
Beta HCG	Serum	Test requested on a male or as a tumour marker in female
Beta Hydroxybuturic Acid - Blood Ketones	EDTA CSF	EDTA: Spin and freeze CSF: Freeze

Test	Samples Type & Volumes	Special Requirements/Information
Beutler Screen (Gal-1-Phos Uridyl Transferase)	Newborn Screening Card NNS Card Lithium Heparin	Red Cell Transfusion invalidates test Clinical details essential Must be received <48hrs and received in Temple St. by 12 noon, send via taxi if the courier is missed. Cards available in Maternity 2 Ward
Biotidinase	Serum	Spin & Freeze
Bird Fanciers Lung Antibodies Chlamydia Psittaci	Serum	Microbe responsible is Chlamydia Psittaci
BK Virus (Polyomavirus)	Serum Urine	NONE
BRAC 1 and 2 gene	EDTA	Minimum 3.5ml EDTA, 10ml EDTA required for Full BRAC1+2 mutation screen
Malaria	Blood Film Slide	Ideally refer 1 ml of EDTA that diagnosis was made from.
Cytogenetics	Bone Marrow Aspirate in RPMI	Crumlin Genetics form MUST be filled in. Includes: FLT3 and NPM1
Lyme Disease (See Borrelia Burgdorferi)	CSF Serum	Delays>72hrs spin and freeze. CSF requests for Lymes disease MUST be accompanied by a serum (Taken on same day, or a day either side of CSF sample time)
Brucellosis Screen	Serum	False Positives if Yellow Fever Vaccine given recently and post Yersinia/Francisella Infection details must be included
Bullous Pemphigoid Desmoglein Antibody (1 and 3)	Serum	Includes Pemphigoid Vulgaris Antibodies
C Peptide	Serum	Spin & Freeze
C Peptide Creatinine Ratio	24hr Urine	NONE
C1 Esterase Inhibitor Complement C1 Inhibitor	Serum	Spin and Freeze

Test	Samples Type & Volumes	Special Requirements/Information
C1q	Serum	**Contact SJH to discuss before testing** **5ml Serum - transport fresh or freeze if sample is not sent on same day** Must be received within 24 hrs, **if the courier is missed please arrange a taxi** Batched 4-5 times a year CH100 performed and then C1q as required
C3 (Complement)	Serum	Associated with Sepsis Endocarditis Glomernephritis
C4 (Complement)	Serum	An acute phase protein C4 levels decrease more than C3 in Immune Complex Diseases e.g. SLE
Caeruloplasmin	Serum	Low levels associated with Wilsons Disease
Caffeine	Serum	Relevant Clinical Details Essential
Calcitonin	Serum	Spin & Freeze Used to treat osteoporosis, hypercalcaemia.
Calprotectin	Stool	Freeze sample. Date and Time must be on sample. It is suggestive but not diagnostic of inflammatory bowel disease
Cannabis	Spot Urine	Qualitative Positive/Not Detected Test Only
Carbamazepine Tegretol	Serum	White Top Tube Used to treat seizures, nerve pain and bipolar disorder.
Carbohydrate Deficient Transferrin CDT	Serum	NONE
Cardiolipin Antibodies Cardiolipin IgG Antibodies	Serum	This test may be requested as part of the Thrombophilia Screen Increased levels in Anti Phospholipid Syndrome Convalescent sample, 6 weeks apart
Carnitine (Total & Free)	Lithium Heparin Guthrie Card	Lithium Heparin: Spin & Freeze for Free Carnitine If only Free Carnitine is required advise a Guthrie Card be used
Catecholamines	24 hour Urine (acidified) **Lith Heparin x 2**	Lithium Heparin: Spin & Freeze Paeds spot urine: Add 0.5mls acid for every 10ml of urine Includes: VMA, Noradrenaline, Adrenaline, Dopamine.

Test	Samples Type & Volumes	Special Requirements/Information
Carbohydrate Deficient Glycoprotein Syndrome CDG Screen Transferrin Isoferase Glycoforms	Serum	Unreliable in neonates <3 weeks, check status of recent transfusions as this may invalidate the results Carbohydrate Deficient Glycoprotein Syndrome Referred to National Hospital for Neurology & Neurosurgery, London
CD4 Count T Cell Lymphocyte)	EDTA	A measure of HIV Progression/StatusMust be tested within 24hrs**Send FBC Report.**
CD34	Bone Marrow Aspirate EDTA Cord blood	Stem Cell Harvesting for Bone Marrow. **MUST contact SJH before referring**
CD38 Bone Marrow Immunophenotyping	Bone Marrow Aspirate in RPMI EDTA EDTA	NONE
Cell Cept Mycophenolate	EDTA	**2ml EDTA refrigerate on arrival** Trough or x3 samples at 20 min, 1hr, 3 hr intervals post administration Specify dose details, administration times, commencement of drug and whether required for efficiency or toxicity
Centromere Antibody Anti Centromere Antibody ACA	Serum	Seen in CREST variant scleroderma and 30% of Raynaud patients. Scleroderma immunoblot test
Complement Function CH100 AP100	Serum	Spin and Freeze CH100 and AP100 (same test performed at the same time)
CGH Array Microarray	EDTA	Samples are only viable for **5 days.** Store at 4oC if delay in transport. Only send out Mon to Thurs
Chagas Disease Trypansoma Cruzi	Serum	Parasite Screen/Tape Worm, Hydatid Screen. Faeces sample for a parasite screen in microbiology OLOL is the first line approach Biomnis refer the serum samples to London
Chikungunya	Serum Lithium HeparinEDTA (PCR)	Spin & Freeze
Chlamydia Trachomatis Serology (CT)	Serum	NONE
Chlamydia trachomatis & Neisseria gonorrhoea (CT & GC)	Urine Swab	Aptima Tube for Urine and Swab **ONLY** Swabs can be Eye, Rectal, Urethral, Penile Endocervical, Pharyngeal, Low Vaginal, High Vaginal Swab

Test	Samples Type & Volumes	Special Requirements/Information
Chromosome Analysis	BM	Consultant Haematologist will hand deliver samples to Referral Department. Munchner Request form filled out & signed by consultant Haematologist. Priority sample **MUST GO** next day. **Samples Refrigerated.**
Chromogranin A	Serum	Spin & Freeze
Citric Acid Citrate	24 hr Urine (Plain)	Freeze 5ml of Plain 24hr Collection. Part of Stone screen analysis.
CJD TSE	CSF	Consult with Microbiology Department
CALR EXON 9	Bone Marrow Aspirate EDTA	9ml EDTA -Haematology request only
Clonorchiasis Chinese Liver fluke	Stool	Part of a Parasite Screen
Clozapine Clozaril Denzapine	Serum	Serum: White Top Tube. Spin & Freeze **If screening only, an FBC report to be sent with sample**
Clobazam Frisium Levels	Serum	White Top Tube. Spin & Freeze
Cocaine	Spot Urine	Qualitative (Positive/Not Detected) Test Only
Collapsin Response Mediator Protein 2	Serum	Refrigerate on arrival Multiple Sclerosis
Complement Lectin Mannose Binding	Serum	5ml Serum Spin and Freeze
Copper	24 Hour Urine Serum	24 Hour Plain Urine: Decant 4mls of 24hr Plain urine sample into plain tube. State total volume on request form
Cortisol Free Urine Cortisol	24hr Urine (Adult) Spot Urine (Paeds)	Plain Urine Container Only. Measure Volume on scales in Biochemistry, write volume on Request form. Aliquot 4mls urine into round bottom container.
Coxiella Burnetti Q Fever	Serum	NONE
Cryoglobulin Screen	Serum	Serum required White/Brown accepted preferred white top sample. Everything must be kept at 37^{O}C, needles, tubes must be incubated prior to venepuncture, and available in Microbiology Incubator Put the completed tubes straight into the 37^{O}C water bath in Blood Transfusion Incubate tubes overnight to separate serum. Do Not Spin.

Test	Samples Type & Volumes	Special Requirements/Information
		Separate into Sarstedt TubesOnce separated the serum can be transported at Room Temperature.**Write 'Protocol Followed' on the form or the sample will be rejected**Haemolysed Samples are not valid. Cryoglobulins are proteins that precipitate in the cold Phone SJH to inform them the cryoglobulin screen is arriving
Cryptococcal Neoforms	Serum Urine CSF	NONE
CSF Electrophoresis Oligoclonal bands	CSF + Serum	CSF & Serum must be sent together. Serum must be taken within 12hrs either pre or post CSF taken
CSF Viral Screen (CNS Screen)	CSF	NONE
CTFR Gene (Cystic Fibrosis Transmembrane Conductance Regulator)	5-10ml EDTA	Available to Adults < 16yrs old if family history of CF. Predictive screening on neonates is performed if both CF mutations are found by the NCMG to be present. 39 mutations are screened for (include Delta 508)
CTx collagen Type 1 Telopeptide	Serum	Osteoporosis screen (Bone turnover marker). NOT for GP's- part of PINP screen
Cyanide	EDTALithium Heparin	Refrigerate on arrival
Cystatin C	Serum	Refrigerate on arrival
Cysteine	Urine	Fasting sample and freeze
Cyclosporin A	EDTA	Immunosuppressant drug. Trough level. Routinely performed Tuesday and Friday. Ring if required urgently.
Cystic Fibrosis C&S	Respiratory Samples	NONE
Cysticercosis	Serum	Infection caused by eggs and tapeworm- This is part of the parasite panel
CMV CMV PCR Cytomeglovirus	Serum Urine EDTA	**Urine:** only for paeds **Serology:**>72hr delay, spin and freeze Only request SCMA if 'CMV only' requested **EDTA:** for PCR **ONLY** Spin & Freeze < 24 hours

Test	Samples Type & Volumes	Special Requirements/Information
Cytotoxic antibodies (post and transplant ab's)	Serum	Serum 10 ml clotted See post-transplant antibodies. H and I Laboratory, Beaumont Hospital, Dublin Urgent Service Available if Required. Details of transplant status and clinical details essential. Non urgent requests delivery within 24 hours is ok.
Dehydroepiandrosterone DHEA	Serum	Not the same test as DHEAS. Review form to ensure if DHEA or DHEAS being requested.
Dehydroepiandrosterone Sulfate DHEAS	Serum	DHEA- Sulfate. Please note this is a different request than DHEA
Delta 508 (CF)	EDTA	Crumlin send to Birmingham Women's Hospital if>16 year old with family history or family member is a carrier for CSF
Type 1 Diabetic Screen	Serum	Serum samples x 2 required **Test includes:** Zinc Transporter ZnT8 Islet Antigen 2 Glutamic Acid Decarboxylase
Dengue Fever	Serum	If there is 72hr delay, spin and freeze serum. **NB. Clinical Details and Travel information Essential** Included in Arbovirus Panel
Dihydrotesterone DHT	Serum EDTA Lithium Heparin	To diagnose Idiopathic hirsutism and hirsutism. Will have normal Testosterone and decreased DHT
Diphtheria Titres Diphtheria Antibodies	Serum	Refrigerate on arrival
DNA Screen dsDNA	Serum	Can be performed on its own and as part of CTD screen. Batch tested weekly
DRVTT Lupus Screen LA	Citrate x4	Take straight to Haematology Department. For processing. Haematology to issue request form to Referral department to send to SJH for testing
E.coli PCR	CSF 0.5ml	Must arrive before 11am. Only if patient has E. Coli bacteraemia or UTI and is <90 days and has evidence of meningitis or has galactosaemia
Epstein Barr Virus EBV PCR	EDTA (PCR) Serum CSF	Spin and Freeze CSF requests must be paired with EDTA samples Request SELM if only EBV stated
Echincoccus	Serum Stool	1 ML Serum Parasite Screen/Tape Worm, Hydatid Screen. Faeces sample for a parasite screen in microbiology OLOL is the first line approach Biomnis refer the serum samples to London
Ecstasy	Urine	Part of Toxicology Screen

Test	Samples Type & Volumes	Special Requirements/Information
Elastase	Faeces	Refrigerate on arrival Liquid Sample not suitable
Endomysial Antibodies (EMA)	Serum	If TTG is positive or TTG normal and IgA deficiency not confirmed EMA may be performed. EMA can be requested on own
Epilepsy Disorder Testing	EDTA	EDTA CeCaT request form with patient consent and consultant signature required.
Epinephrine Adrenaline	24hr Acidified Urine Lithium Heparin	Urine: Freeze Lithium Heparin: Spin and Freeze
Enterovirus	Swab CSF EDTA (PCR)	Included in Respiratory Viral Panel, (Code LRSC) CSF Viral Panel (Code ACSF). Culture/Tissue available by arrangement with NVRL
Erythrocyte Protoporphyrin Porphyrins	EDTA	EDTA x 2 Protected from light Clinical details, medication and Family history **MUST** be included
Erythropoietin EPO	Serum EDTA	Spin and Freeze
Ethosuximide Zarontin	Serum	White Top Tube. Spin & Freeze
Ethylene Glycol Anti-Freeze	Serum Urine NPA -Nasopharyngeal	Serum: Spin & Freeze Not valid for aspirates **Requesting Consultant must contact the Principal Biochemist in Beaumont to authorise (01) 8092675** **NB. Include details of the samples ingested**
Extractable Nuclear Antibodies ENA	Serum	Antibodies include Anti-SS A (Ro), Anti-SS B (LA), Anti- RNP, Anti-Sm, Anti-Jo-1, Anti-Scl-70, Anti-Synthase. Also a reflex test when ANA is positive and for Connective tissue screen (fibromyalgia)
Extrinsic Factor Screen	Citrates	**Spin & Freeze <4hours** by Haematology staff only **Adults:** Citrates x 6 **Paediatrics**: Citrates x 5 **Test Includes**: Factor II, Factor V, Factor VII and Factor X. Urgent samples must be received within 4 hours with referring laboratory. **Urgent request to be agreed with Haematology Consultant**

Test	Samples Type & Volumes	Special Requirements/Information
Factor II:C (Extrinsic Factor Assay)	Citrates	**Spin & Freeze < 4 hours by Haematology staff only.** **Adults & Paediatrics 2 x Citrates** Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to extrinsic factor assays for number of samples required. Urgent request to be agreed with Haematology Consultant
Factor IX Inhibitor	Citrate	Haematology will **Double Spin & Freeze < 4 hours**. **Adults**: 3 x Citrates **Paediatrics:** 2 x Citrates Urgent samples must be received within 4 hours with referring laboratory. Urgent request to be agreed with Haematology Consultant
Factor VII:C (Extrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults & Paediatrics **2 Citrates.** Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to extrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor V:C (Extrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults and Paediatrics require 2 Citrates. Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to extrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor X:C (Extrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults & Paediatrics 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to extrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor IX:C (Intrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** **Adults and Paediatrics** 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to intrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**

Test	Samples Type & Volumes	Special Requirements/Information
Factor V Leiden (Activated Protein C Resistance)	Citrate EDTA	**Adults:** 1 EDTA & 2 Citrate Thrombophilia form and Genetic consent required. EDTA must be sent within 5 days of Phlebotomy DO NOT FREEZE EDTA SAMPLE. Must accompany APCR request. APCR Haematology Spin & Freeze < 4 hours. **Paediatrics:** 2 x Citrates. Spin & Freeze <4 hours by Haematology. APCR only. Urgent samples must be received within 4 hours with referring laboratory **Urgent request to be agreed with Haematology Consultant**
Factor VIII:C (Intrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults & Paediatrics 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory if more than 1 factor assay is being requested, please refer to intrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor VIII Inhibitor	Citrates	Test Requirements: 3 x Citrates (Adults) 2 x Citrates (Paeds) Haematology will Double Spin & Freeze < 4 hours. Urgent samples must be received within 4 hours with referring laboratory. Urgent request to be agreed with Haematology Consultant
Factor XI:C (Intrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults & Paediatrics 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to intrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor XII:C (Intrinsic Factor Assay)	Citrate	**Spin & Freeze < 4 hours by Haematology staff only.** Adults & Paediatrics 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory If more than 1 factor assay is being requested, please refer to intrinsic factor assays for number of samples required. **Urgent request to be agreed with Haematology Consultant**
Factor XIII Activity	Sodium Citrate	**Haematology Staff will Double Spin & Freeze < 4 hours** **Adults**: 3 x Citrates **Paediatrics:** 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory. **Urgent request to be agreed with Haematology Consultant**

Test	Samples Type & Volumes	Special Requirements/Information
Factor XIII Antigen Assay	Sodium Citrate	**Haematology Staff will Double Spin & Freeze < 4 hours** **Adults**: 3 x Citrates **Paediatrics:** 2 x Citrates. Urgent samples must be received within 4 hours with referring laboratory. **Urgent request to be agreed with Haematology Consultant**
Farmers Lung Antibodies	Serum	NONE
Faecal Fat	Stool	NONE
Flecanide Levels	Serum	Spin & Freeze
Fluoxetine (Prozac)	Serum	Spin & Freeze Developmental Delay, Seizures, Hypotonia
Flow Cytometry (Immunophenotyping) Lymphocyte Screen	Bone Marrow (BMA) Blood Film Bone Marrow Aspirate Slide EDTA Pleural Fluid CSF	**BMA; Bone Marrow in RPMI** must be received in SJH on the same day **EDTA;** can be refrigerated for up to 5 days **Pleural Fluids;** add 10ml RPMI CSF Contact Referring Lab as it is an unusual request Include copy of FBC Results Myelodysplastic Syndrome Screen includes: CD45, 34, 11719, 14 Myeloma Screen includes: CD38, 138, 19, 45, 56. CSF samples refer to 13C Haem in SJH
Fragile X	Lithium Heparin & EDTA	Referred to NCMG Crumlin. Store at room temperature if there is a delay in transport. Sample viable for 2 weeks at room temperature. Must include developmental delay, learning difficulties, motor delay etc. In clinical details or NCMG will not perform.
Francisella Screen (Tularaemia)	Serum	1ml Serum refrigerated on arrival
Fructosamine Glycosylated	Serum	NONE
Free Fatty Acids (FFA) Non-Esterified	Serum	Spin and Freeze Patient must be in a fasting state, clinical details required

Test	Samples Type & Volumes	Special Requirements/Information
Fungal Culture Tinea Dermatophyte Mycosis Ringworm Aspergillus Cryptococcosis Cryptococcus neoforms Mycology	Nail Chippings Skin Scrapings Hair Follicles BAL (PCR) Sputum (PCR) Aspirate Bone Marrow CSF Swab	Requires a Myctrans Envelope for skin scrapings Include Site in Clinical Details Line
Fungal Susceptibilities	See Fungal Culture	NONE
Gabapentin Neurontin	Serum	White Top Tube Spin & Freeze
Galactomannan Aspergillus	Serum BAL Aspirate (tracheal)	6ml Serum or Sterile container required Test is only run on a Tuesday and Friday
Gastric Parietal Cells Parietal Cells	Serum	Test is run as part of The LKMA(liver & Kidney profile) and on its own
Gastrin	Serum	Spin and Freeze
Genetic Tests (various)	Lithium Heparin EDTA	All genetic tests are referred to Crumlin. If Crumlin do not offer the test they will refer to CeGat. In notepad document the specific genetic test required.
Glomerular Basement Membrane Antibodies Anti GBM	Serum	NONE
Glucagon Stimulating TestGrowth Hormone & IgF1	Serum	Spin & Freeze all samples. Ref to ***LP-REF-0007 Referral Tests with Special requirements***Phone SJH to inform them
Glucose-6-Phosphate Dehydrogenase 6GPD	EDTA	2ml EDTA refrigerate on arrival MUST send FBC report with sample
Glutamic Acid Decarboxylase Antibodies GAD Anti GAD Antibodies	Serum	Associated with newly Diagnosed Type 1 Diabetic (80%)
Ganglioside antibodies	Serum CSF	SJH refer to: Churchill, Oxford Associated with Guillane-Barre Syndrome. Basal ganglioside requests refer to 35B
Lysosomal Enzymes Screen / Lysosomal Storage Disease LSD (White cell enzymes)	Spot Urine **Transfer into Round Tube**	If an MPS disorder is suspected then a urine should be sent to Willink **Urine should be sent <u>prior to</u> or <u>at the same time</u> as white cell enzyme test** Clinical Details Essential Includes: Orotic Acid and Oligosaccharides

Test	Samples Type & Volumes	Special Requirements/Information
Neisseria gonorrhoea (GC)	Swab Urine	Aptima tube required- Check Aptima tube is in date
Group B Streptococcus (PCR)	CSF 0.5ml EDTA	CSF: Only if aged <90days EDTA: <7days
Growth Hormone GHPituitary Function Screen	Serum	Performed on Thursdays
Haemochromatosis HEMC HFE Gene	EDTA	5ml EDTA Ambient if transport is >48 hours sample must be refrigerated **Test includes:** Gene C282Y, H63D store at 4oC if >24hr **This test requires a Biomnis Genetic consent form available online** For S65C mutation contact Biomnis directly
Haematological Malignancy Diagnostic Service HMDS for Immunophenotyping and FISH analysis	Bone Marrow aspirate in EDTA	**PLEASE NOTE on form if samples should go to LEVEL 3 OR LEVEL 5 at HMDS** 4 FRESH unstained smears AND Bone Marrow aspirate in EDTA Samples prepared by NCHD in Oncology. Ensure request form complete, any "High Risk" stickers are used. Check Sample media (EDTA) are used. Store all at 4-8oC, keeping unstained slides moist with saline
Haemoglobin Electrophoresis (HPLC) (<16 years old) Haemoglobin Electrophoresis (HPLC) (>16 years) includes Thalassaemia Screen	EDTA	Serum sample is required if Ferritin result not available Please attach an FBC Report. Include Ferritin result if available
Haemophilus Influenza B Antibodies HIB Titres	Serum	NONE
Haemophilus Influenza	CSF EDTA	Type B result
Haptoglobins	Serum EDTA	Patients > 1 year 4ml EDTA or 5ml Serum Infants <1 year send White top serum to biochemistry Crumlin
HE4 (Human Epididymis Protein 4)	Serum	Spin & Freeze Run in conjunction with CA125- ovarian and endometrial cancer **Confirm with the Requesting Consultant whether the test is essential**
Helicobacter Pylori (H. Pylori)	Serum Stool	Stool sample is frozen Serum sample not frozen

Test	Samples Type & Volumes	Special Requirements/Information
Heparin Induced Thrombocytopenia HIT	Serum	**Serum samples x 2 Spin and freeze 700ul into several Sarstedt tubes** Refer frozen the next day Must have completed HIT request form, available from Referral Dept. **Discard if sample is haemolysed and ask for repeat.**
Hepatitis A IgG Titres	Serum	Only send if titres are specifically requested - indication of immunity
Hepatitis A IgM	Serum	Ensure Hepatitis E code is also requested (HEFM)
Hepatitis B Surface Antigen (Hep B sAg)	Serum	NONE
Hepatitis B Core Antibodies (Anti-HB c Ab)	Serum	NONE
Hepatitis B Surface Antibodies (Anti-HBs) (Hep B Titres)	Serum	NONE
Hepatitis B Viral Load Hepatitis B GenotypesHepatitis B PCR	EDTA	Spin & Freeze
Hepatitis C Virus Hep C Hep C Ag	Serum	NONE
Hepatitis C Antibody Anti-Hep C Anti H cab	Serum	NONE
Hepatitis C Viral Load Hepatitis C Genotypes Hepatitis C PCR	EDTA	Spin & Freeze
Hepatitis D Delta Virus	Serum	Infection only occurs if patient has Hepatitis B
Hepatitis E Hep E IgM	Serum	This test is always completed in conjunction with Hepatitis A therefore when logging Hep E also input the code HAGR
Herpes Simplex Virus HSV 1+2	CSF Serum Viral Swab Urine EDTA for PCR only	EDTA - Spin & Freeze
Human Herpes Virus 6 HHV 6	EDTA CSF Saliva	HHV-6 DNA testing is by request only in adults and children >3 yrs. of age (with the exception of neonates). PCR is the test of choice.

Test	Samples Type & Volumes	Special Requirements/Information
HIV Human Immunodeficiency Virus HIV Viral Load HIV PCR	Serum EDTA (PCR)	EDTA for PCR: Spin & Freeze
HLA B27, DR4, B44, DRB1 0407	EDTA Citrate	5- 10 ml EDTA or Citrate - keep at room temperature
HLA typing	EDTA Citrate	Minimum 5ml EDTA or Citrate. Please note **Do Not Place in the Fridge** Samples can be Stored at room temperature for 1 week IBTS forms available from Referrals or ordered directly from IBTS HLA B57 01 only for HIV Patients
Homocysteine	Urine EDTA Serum Lithium Heparin (paeds)	Spin & freeze all sample types Sufficient Clinical details must be provided
Homovanillic Acid HVA	24hr urine	Clinical Details and Current Medication Essential
Human T-Lymphotropic Virus HTLV 1+2	Serum	NONE
Hypoglycaemic Work-Up	• Fluoride EDTA • Serum white topped • Lithium Heparin • Spot Urine • Guthrie Card	All samples are frozen Refer to *LF-REF-0022 Hypoglycaemic Workup Request Form* for individual codes. You can also refer to *LP-REF-0007 Referral Tests with Special Requirements*
IgE Specific RAST	Serum	Allergens are referred to Beaumont. Any allergens that are not tested for in Beaumont are referred to Eurofins Biomnis.
Insulin Like Growth Factor 2 IGF-11 IGFR-11	Serum	Spin & Freeze
IGF-BP3	Serum	Spin & Freeze
IgG Sub-Classes (1-4) IgGs	Serum	IgG1, 2&3 processed. IgG 4 is only processed on special request (autoimmune pancreatitis)

Test	Samples Type & Volumes	Special Requirements/Information
Infliximab Levels and Antibody Remsima Anti-Remicade® antibodies anti-Infliximab antibodies Inflectra	Serum	Ensure that the sample is referred at Room Temperature (RT) If level is <1ug.ml then antibody level will be performed Details Required include infusion dosing, no. of doses and reason for request.
Influenza (A and B)	Viral Swab	Influenza Screen includes: Influenza A (H1/H3 subtype analysis) Influenza B RT-PCR Swine flu influenza A/H1 Parainfluenza 1,2, 3 + 4 Human Metapneumovirus RSV Adenovirus
Inhibin A and B	Serum	Spin & Freeze
Insulin Antibodies	Serum	Spin & Freeze
Insulin Level	Serum	Spin & Freeze Different to Insulin antibodies
Insulin Like Growth Factor IGF-1 IGFR	Serum	Spin & Freeze
Interleukin 2 Receptor IL2	EDTA	Spin and Freeze
Interleukin 6 Receptor IL6	Serum	Spin and Freeze
Intrinsic Factor Antibodies	Serum	Spin & Freeze Low B12 / Pernicious anaemia Clinical Details essential as B12 injected 14 days prior to testing invalidates results
Intrinsic Factor Screen	Sodium Citrate	Spin & Freeze < 4 hours by Haematology staff only. Citrates x 6 for Adults and Citrates x 5 for Paediatric **Test Includes:** Factor VIII, Factor IX, Factor XI, Factor XII. Urgent samples must be received within 4 hours with referring laboratory
Iodine	Serum	Refrigerate on arrival

Test	Samples Type & Volumes	Special Requirements/Information
Islet Cell Antibodies	Serum **Refrigerate**	Islet Cell Antibodies are also part of the Type 1 Diabetes Screen- See Code T1DS
Isoniazid Level	Lithium Heparin Serum	Spin & Freeze Anti TB Drug, take the sample 3 hrs post dose Clinical Information required includes: patient height, weight
Itraconazole Level	Serum	**Requires Consultant Microbiologist Approval** Bristol
Jak 2 Mutation Janus Kinase	EDTA BMA	**EDTA:** 9ml EDTA **BMA:** 9ml BMA Needs approval from Haematology team. **Only ever performed once so check patient's history**. Screen can include t(11;14), t(14;18), t(15;17), t(8;21)
Karyotyping (< 5 years old)	Lithium Heparin x 2 (1-2ml for neonates)	1-2ml Lithium Heparin Requires a NCMG request form. NCMG will only perform Karyotyping on patients under 18 years of age when investigating the following conditions *Trisomy* *Numerical sex chromosome abnormalities* *Mosaicism* Or with the following clinical details *Ambiguous genitalia* *Family history of chromosome abnormality* **If Karyotyping is requested without those details present on patient's <18yrs contact team** (see NCMG guidelines LI-REF)
Karyotyping (>5 years old)	Lithium Heparin x 2	Requires a Guy's and St Thomas genetic request form. Cannot be sent after Thursday morning as it will not make lab before it closes for weekend.
Keppra Levetiracetam	Serum	White Top Tube Spin & Freeze Clinical Details of dose essential
Kidney Stones Liver Stones Bladder Stones	Stone	Use a dry Universal Container Refer to the referral unit in the Mater Hospital **State the total volume on the form** Includes: Oxalate, uric acid, citrate, creatinine, Na and Ca **Sample Site must be selected from F4 on the keyboard**
Lacosamide Level	Serum	White Top Tube Spin & Freeze

Test	Samples Type & Volumes	Special Requirements/Information
Lactate	CSF	Freeze **Do not freeze in glass tubes**
Lactose Intolerance	Serum Stool	**Not Available for GP's** Advice Stool for Reducing Substances Serum **s**ent to Sheffield
Lamictal Levels **Lamotrigine Levels**	Serum	White Top Tube Spin & Freeze
Lead	EDTA Urine	URINE requires end of day sample
Leishmania Complement Fixation Test	Serum EDTA	Parasite reference Laboratory
Leptospirosis **Weil's Disease**	Serum	If positive or clinically indicative then NVRL refer to Leptospira Reference Unit, Herford, UK
Keppra **Levetiracetam**	Serum	White Top Tube Spin and Freeze Clinical details of dose essential
Lexapro **Escitalopram** **Citalopram**	Serum	Serum White Top Spin & Freeze Include Dosage, Commencement Date, and Reason for Test (Toxicity, Efficiency) Anti-depressant.
Lipase	Serum Urine	Serum**:** 1ml Urine**:** 24 hr plain Urine or Spot Urine
Lipoprotein A **LpA**	Serum	NOT to be confused with LPA1
Listeria Monocytogenes PCR	CSF EDTA Serum Lithium Heparin	**CSF Child**: If child is > 90days old it must include clinical indication for testing (15A) **CSF Adult**: Refrigerated (12A) **Serum:** 1ml (12A) **EDTA**: 2ml (12A) **Lithium Heparin:** 2ml (12A)
Liver/Kidney Microsomal Antibodies **LKMA Antibodies**	Serum	This screen includes the following tests: Liver/Kidney Micro Mitochondrial Abs Parietal Cell Abs Smooth Muscle abs

Test	Samples Type & Volumes	Special Requirements/Information
LRP4 Myasthenia Gravis Screen	1 ml screen	Low density Lipoprotein Receptor related Protein 4 (LRP4) Part of Myasthenia gravis screen and includes anti ACHR and anti-MUSK antibodies
Lupus Screen	Citrate	**Not Available for GP's** **Test Requirements:** **Adults:** Citrates x 3 St James Hospital Thrombophilia request form required. Samples to be double spun at 4oC and separated by Haematology Dept. **Paeds:** Citrates x 2 Samples to be double spun at 4oC and separated by Haematology Laboratory
Lyme Disease (See Borrelia Burgdorferi)	Serum	Spin and freeze if >72 hour delay
Macroprolactin	Serum	Prolactin Reflex TestWrite the prolactin result on the form. Only refer with Bio approval. If Monomeric Prolactin is requested it should be referred out for macroprolactin as during the process of measuring/removing the macroprolactin - the end result is called monomeric prolactin
Magnesium	24hr Acidified Urine	Cannot be done on a spot urine sample. PH of 1 required. Can be added retrospectively.
Malaria Confirmation	Blood Film	Sent to the London School of Hygiene & Tropical Medicine. Special request form available in referrals department
Manganese	Serum EDTA Lithium Heparin Spot Urine	NONE
Mannose Binding Lectin	Serum	Spin & Freeze
Mast Cell Tryptase-Tryptase	Serum	Samples should be taken within 1 hour of anaphylactic reaction and subsequently at 3 and 24 hours post reaction. Increased levels found up to 12 hours post anaphylactic shock.
Measles IgM and IgG	Serum Saliva	IgM -recent infection IgG - immunity

Test	Samples Type & Volumes	Special Requirements/Information
Neisseria meningitidis N. meningitidis Meningococcal PCR	EDTA CSF	Must be received before 11.00am for same day result
Metanephrines	EDTA 24 hr Acidified Urine Spot Urine (paeds only)	EDTA: Spin & Freeze **Adult:** 24 hr Acidified Urine Freeze Includes: Normetadrelin/metadrenalin/Metanephrines **Paeds: Spot Urine only:** Add 0.5ml HCL to urine<1 hour to give pH<4.0, paraffin lid
Methadone	Spot Urine	Qualitative Test (Positive/Not Detected)
Methanol	Serum Glucose	Referral Sample taken at time of admission Requesting Consultant to contact Principle Biochemist in BH to authorise test (01) 8092675 HPLC requires 1 full day's work Substances taken and Clinical Details are essential
Methotrexate	Serum	NONE
Methylmalonic acid	Lithium Heparin Urine	Lithium Heparin: Spin & Freeze Urine: Freeze Screen for Low Vitamin B12
Mitochondrial Antibodies	Serum	Also part of the LKMA
MPL Mutation	EDTA	NONE
Mucopolsaccharide MPS GAG Arylsulphase C	Urine Ascitic Fluid	**Urine:** 5-10 ml **Ascitic Fluid:** 10 ml
Mumps Paramyxovirus	Serum Saliva Buccal Swabs	Only order IgG if titres are requested
Mycoplasma genitalium	Anogenital swabs Urine	Aptima kit required
Atypical Pneumonia Screen	SerumCSFThroatStool	Dry swabs, sputum and urines are not suitable samples >20 years old refer to Biomnis<20 years old refer to NVRL

Test	Samples Type & Volumes	Special Requirements/Information
Myelin Associated Glycoprotein Antibodies (MAG) Myelin Oligodendrocyte Glycoprotein (MOG)	Serum	NONE
Myleoperoxidase Antibodies MPO	Serum	Performed as a reflex test when ANCA is positive
Myeloma Screen Serum Protein Electrophoresis SPEP	Serum	NONE
Myositis Screen	Serum	Includes Mi-2α, Mi-2β, Ku, PM-Scl1100, PM-Scl75, SRP, PL-7, Pl-12, EJ, OJ, Jo-1, Ro-52, TIFIγ, MDA5, NXP2 and SAE1
Myoglobulin	Serum Urine	**Serum:** not frozen **Urine :** Freeze 24hr Plain Collection or Spot Urine
Natural Killer Cells (NK) Lymphocyte Immunophenotyping CD16CD56	EDTA	**EDTA: 3ml EDTA whole Blood AMBIENT** The sample must reach Biomnis **WITHOUT FAIL** within 24 hrs following sampling**DO NOT** collect on Saturdays. Always attach the lymphocyte count performed on the same day as sampling, (FBC report). GP's must contact the laboratory before sending the sample as these must be tested within 24 hours
Neonatal Allo-immune Thrombocytopenia (NAITP) HPA- Platelet Genotyping HNA-Neutrophil Genotyping NAIN (Neonates) AAN (Adults)	EDTA Serum	**Mother:** 6ml clotted serum **AND** 6 ml EDTA **Father:** 6 ml EDTA ONLY **Neonate: 2ml clotted blood + 2ml EDTA** HPA 1a/1b,2a/2b,3a/3b,4a/4b,5a/5b are tested Special Form (NBC/HLA/F230) from hlnatnl@nhsbt.nhs.uk **Referred to Bristol after approval from the Haematology Team in OLOL**
Neuron Specific Enolase NSE	Serum	Spin & Freeze Confirm request with requesting clinical team
Neuronal Antibodies Paraneoplastic Antibodies	Serum CSF	Serum/ CSF 2.5ML **Test includes:** Hu,Yo,R1,CV2,CRMP5 Ma 1 and 2, Amphiplysin
Nodal/Paranodal Antibodies	Serum	NONE

Test	Samples Type & Volumes	Special Requirements/Information
NOTCH 3	EDTA	Minimum 1-2mls CADASIL -Cerebral Autosomal Dominant Arteriopathy with subcortical Infarcts and Leukoencephalopathy
NT-pro-BNP	Serum	Heart failure Marker
Winter Vomiting Bug (Molecular Gastroenteritis Screen)	Faeces Rectal Swab	Tests include: Norovirus, Rotavirus, Rotavirus vacc. Strain, Adenovirus, Astrovirus, Sapovirus
Occupational Health Screen	Serum	Includes Anti HBs (Hep B titres), Anti VZV (IgG) ,Measles IgG, Mumps IgG, Rubella IgG
Nortriptyline Amitriptyline Motival Elavil Laroxyl	Serum	Spin & Freeze **Include the following:** Dosage, Commencement Date, reason for Test e.g. Toxicity, Efficiency
Opiates	Spot Urine	Qualitative Test (Positive/Not Detected)
Organic Acids	Spot Urine	Freeze **Clinical Details essential & PH level on FORM.** Samples only go to Temple street when pre-arranged by consultant with Temple Street (TS) Phone TS to ensure they are aware sample is coming. All developmental/ Learning difficulty etc. samples to go to Biomnis Quantitative requests for MMA, EMA Glutarate are processed once a week Paeds<3 days old are difficult to diagnosis Inborn Errors of Metabolism (IEM)
Osmotic Fragility Membrane Screen (EMA)	EDTA	Send FBC report and film- Needed within 24 hours of Phlebotomy, Please phone St James Hospital before sending test.
Oxidative Burst Neutrophil Function Test Neutroblasts	EDTA	**Sample:** EDTA -Ambient must be tested within **4 hours** send **URGENTLY** by Taxi. Samples will not be tested after 16.00pm (advise repeat in morning if to late) **MUST be PRE-ARRANGE**D with Haematology Dept in Crumlin or SJH. Used in Diagnosis of CGD.

Test	Samples Type & Volumes	Special Requirements/Information
Oxalate **Oxalic Acid**	Serum 24hr Acidified Urine	Spin & Freeze Sample should be taken in a fasting state. Infant sample should be taken 3-4 hours after Bottle **Urine:** 24 hr Acidified urine. Please ensure record of the total volume is on request form before referring.
Oxcarbazepine **Trileptal** **Zebinx** **Eslicarbazepine**	Serum	NONE
Pancreatic Polypeptide	1ml Serum	White Top Tube Spin & Freeze
Paroxysmal Nocturnal Haemoglobinuria **PNH**	EDTA	NONE
Parasite Screen **Ova and Parasite**	Faeces Serum	Parasite Stool Screen includes: Toxocara, Schistomas, Trichnella Echincoccus, Wucheria Ehincoccus Cysticercosis
Parathyroid Related Peptide PTH-rp	Aprotinin tube	Spin & Freeze Aprotinin tubes are available from the Referral Dept Authorization required from Endocrinologist directly, contactable via switch
Parathyroid Hormone **PTH**	Serum	Spin & Freeze
Parvovirus Antibodies (B19/Slapped Cheek)	Serum Saliva	NONE
Parvovirus PCR	EDTA	NONE
PFA-100 **(Platelet Function Analysis)**	Coagulation Tube Whole	**Same Day Referral, please refer via taxi**. Has to be in Coagulation Lab SJH before 2pm. **DO NOT SEPARATE OR SPIN** MUST have Haematology approval
Phenobarbital **Phenobarbitone**	Serum	White Top Tube

Test	Samples Type & Volumes	Special Requirements/Information
Pyruvate Kinase Deficiency Erythrocyte Pyruvate Kinase	EDTA	Paeds tube. Refer FBC and RETIC report. Use referral request from: www.viapth.co.uk/departments-and-laboratories/red-cell-centre-protein-laboratory. For attention of Chris Lambert.
Phenylalanine TyrosinePKU	SerumLithium HeparinDried blood spot card	This test is performed for both paediatrics and Adults on a serum/plasma or dried blood spot card- 2 full circles required on card. **Clinical details are essential**No weekend service.If received before 12.00 will be processed that day
Phosphate	spot urine	Paeds only
Phosphoethanolamine (paeds)	Urine	Spot Urine For hypophostasia disorder (early loss of teeth)
Phospholipid Antibodies Anti-Phospholipid	Serum	Includes Cardiolipin antibodies & b2glycoprotein
PINP - Procollagen 1 Intact N Terminal	Serum	Baseline before commencement of therapy and subsequently 3 and 6 months post therapy. Bone Turnover Marker
Anti PLA2R Antibodies	Serum	White Top Tube
Plasma Viscosity	EDTA	2 x EDTA
Platelet Immunotyping	Sodium Citrate	Must be in referral laboratory <8hrs post phlebotomy Phone Laboratory in advance
Pneumocystis Jiroveci PJP PCP	BAL Sputum	600ul of sample required. PJP testing is recommended in lower respiratory tract specimens received from symptomatic immunocompromised and immunosuppressed patients only- Contact Consultant Microbiologist if any queries.
Pneumococcal Antibodies	Serum	IgG Titres

Test	Samples Type & Volumes	Special Requirements/Information
Pneumococcal PCR **Strep. Pneunomiae** **S. pneumoniae**	EDTA CSF Pleural Fluid Joint Fluid	Sample must be received before 11am for same day result
Polio Antibodies **PV1** **PSV1** **Poliovirus type 1** **Poliomyelitis**	Serum	Type 1,2 and 3 performed
Porphyrin Screen	**ALL SAMPLE REQUIRED** EDTA Lithium heparin Faeces Urine Spot/24hr plain	Protect All samples from light. For full screen all samples are required, EDTA + Lithium Heparin + Faeces + Urine
Post Mortem Toxicology	Blood Urine	NONE
Post Transfusion Purpura **PTP**	EDTA & Serum	**Discuss with IBTS Consultant/Registrar** Must be accompanied by NHSBT form available from the Referrals Department
Pox Virus **Molluscum Contagiosum**	Skin Tissue Vesicle Fluid	BY ARRANGEMENT ONLY - NVRL will give code when requested
Post-Transplant **Antibody Transplant** **Rejection. Cytotoxic ab's**	Serum	Serum 5-10ml Call Haematology + Immunology lab in Beaumont if a sample is deemed urgent for same day processing. Clinical details must indicate: 1. If the patient is post-transplant. 2. If patient has undergone a kidney transplant the creatinine result **must be** included on request form.
PreAlbumin **TTR** **Transthyretin**	Serum	ALWAYS specify patient Age & Gender
Pro Collagen III **N-Terminal propeptide of type III procollagen**	Serum	Spin & Freeze

Test	Samples Type & Volumes	Special Requirements/Information
Products of Conception POC (Cytogenetics Testing)	Tissue	Samples taken into a dry universal container. If sample is not sent out within 24hours then add 0.9% sterile saline (sufficient to cover the tissue) and store in Blood Sciences cold Room. Samples **CANNOT** be processed if in formalin but GOSH can run Trisomy PCR on Paraffin wax shaving if 100% Foetal tissue consult with physician if this is required. **Turnaround time very much dependent on testing requirements**
Proinsulin	Serum	Spin & Freeze
Propoxyphene	Spot Urine	Qualitative Test (Positive/Not Detected)
Prothrombin Gene Mutation Analysis	EDTA	Store at 4oC
Chlamydia Psittaci Psitascosis Serology Ornithosis	Serum	Psittacosis, transmitted by psittacidae, is a severe infection inducing a malignant septicaemic infectious syndrome. Ornithosis, transmitted by pigeons and possibly other birds or domestic mammals, is a generally benign atypical pneumopathy.
Purines Pyrimidines	Spot Urine	10mls of spot urine frozen
Quantiferon Gold TB Test (IGRA) Gamma Interferon Level	Quantiferon Gold TB Kits	**Sample requirements:** Special Kits available from Phlebotomy. Four tubes required: Green, Yellow, Purple and Grey Samples only processed Monday- Thursday. After venepuncture invert tubes 10times and laboratory staff will do same on receipt Incubate at 37^{O}C in Microbiology overnight for minimum 16hrs and maximum 24 hrs. Refer to *LP-REF-0007 Referral Tests with Special Requirements* for full procedure TB Confirmation Fill in Biomnis Incubation Details on Quantiferon Forms available in Referrals
Red Cell Folate	Serum and EDTA	1 ml serum and 5ml EDTA whole blood This is a calculation from HCT result and folate result. FBC must be kept refrigerated

Test	Samples Type & Volumes	Special Requirements/Information
Reducing SubstancesReducing Sugars	StoolUrine spot	Fish Odour SyndromeUrine Add HCL to give pH of <2 0.5 mls for every 10ml of urine
Referred Film	Blood Film	FBC sample and FBC report may also accompany the Blood Film - Haematology Staff will advise. Blood Films referred for 2nd opinion at request of Consultant. No return report given. FBC and report may also be sent. All details of what was sent where to be recorded in notepad in Winpath.
Renin Activity	EDTA	Spin & Freeze
Ritalin Methylphenidate	Serum	White Top Tube Spin & Freeze
Rohypnol Flunitrazepam	Serum	Spin & Freeze **Clinical Details:** Medication and Quantification paramount
Rotavirus	Stool Rectal Swab	See Winter Vomiting Bug (Molecular Gastroenteritis Screen)
Rubella Antibodies	Serum	Current Rubella infection is IgM. The vast majority of requests are IgG
Sacromeric Antibodies	Serum CSF	Can be requested with paraneoplastic antibodies which go to Beaumont
Selenium	URINELithium Heparin	2 ml Lithium Heparin Refrigerate or 20 ml Spot Urine refrigerate
Seroquel Level Quetiapine Xeroquel	Lithium Heparin	**Clinical Details:** Medication and Quantification
Sertraline level	serum	White Top Tube Spin & Freeze
Serum Free Light Chains SFLC K.L Ratios FK+A347/FL	Serum	Test not available for GP's.
Sex Hormone Binding Globulin SHBG	Serum	NONE

Test	Samples Type & Volumes	Special Requirements/Information
Somatostatin	Aprotinin tube	Spin & Freeze
Squamous Cell Carcinoma (SCC) TA4 antigen (TA)	Biopsy Serum	**Serum**: 2ml serum refrigerate **Biopsy**: 1ml Aspiration biopsy Ask the clinical team to contact the Consultant Pathologists before referring the serum as the gold standard test is a Histology Test
Steroid Profile Urine	Spot Urine 24 Hour Plain Urine	**Spot Urine/24 hr urine: Freeze 20mls** **24 Hour Urine:** Plain Collection Clearly state steroids required. 24 hr collection to examine daily steroid excretion rates. A spot urine is ideal for inborn errors of metabolism.
Strychnine	Serum	NONE
Sulphonylureas	Serum 24 hour Plain Urine Spot Urine	**Serum:** Spin & Freeze **Urine:** 24 Hour urine collection or Spot urine freeze
Syphillis	Serum CSF	Treponema Pallidum is the causative agent. CSF requests MUST have a serum sent at same time. Arrange CSF samples with Clinical team in NVRL 01 7164418. NVRL refer CSF requests to UK
T and B Cells Lymphocyte subset analysis CD4/CD8	EDTA	**Paediatrics:** MUST be tested within 12 hours. Send via taxi to Crumlin if the courier is missed. Always Include most recent FBC Report **Adults:** Must be tested within 72 hours. Always send FBC report. Store samples at room temperature
T Cell rearrangement	Bone Marrow in RPMI EDTA	**Requires Haematology Consultant Approval** Includes: T 11:14 PCR
Tacrolimus Prograf, FK 506	EDTA	NONE

Test	Samples Type & Volumes	Special Requirements/Information
Phenobarbital Levels Carbamazepine Level	Serum	White Top TubeUsed to treat seizures, nerve pain and bipolar disorder
Testosterone	Serum	NONE
Tetanus Antibodies Tetanus IgG	Serum	Clinical Details Essential
Theophylline (Uniphylline)	Serum	White Top Tube New-born interpretation difficult due to theophylline converting to Xanthine
Thiopurine Methyltranferase TPMT	EDTA Lithium Heparin	**EDTA:** for both Activity and Phenotyping **Lithium Heparin:** For Activity ONLY Transfusion (90 days) can mask a TMPT deficiency **Clinical Details Essential**
Thrombophilia Screen & Lupus request	Sodium Citrate EDTA	**Adults:** Sodium Citrate x 6 & EDTA x1 **Paeds:** Citrates x 4 **Tests Include:** Protein C, Protein S, Anti-Thrombin, Lupus Anticoagulant, APCR, Prothrombin Gene Mutation, and Factor V Leiden St James Hospital Thrombophilia request form required. **Samples to be double spun at 4oC and separated by Haematology Dept**.
Thyroglobulin AntibodiesTG	Serum	5ml Serum Test is Only performed when the clinical details state Thyroid Cancer and/or Post Thyroidectomy
Thyroid Receptor Antibodies TRAB Long Acting Thyroid Stimulating Test LATS	Serum	5 ml Serum
Tobramycin	Serum	White Top Tube
Topiramate Topamax	Serum	Spin & Freeze
Torch Screen	Serum Swab (HSV Only)	**Serum**: for Toxoplasma, Rubella & CMV. **Swab:** for HSV. All sent together for TORCH screen

Test	Samples Type & Volumes	Special Requirements/Information
Toxicology Screen Drugs of Abuse	Serum Urine	**Serum:** White Top Tube. Spin & Freeze **Test includes:** Benzodiazepine, Barbiturates. **Urine Test Includes:** Amphetamine, Benzodiazepine, Barbiturates, Cannabis, Cocaine, Ethanol, Urinary Alcohol (Ethanol), 6 Mono Acetyl Morphine (6MAM- only if requested), C421Methadone, Opiates, and Propoxyphene. **Please note the following** **URGENT out of hour requests** contact ED for "Instant-View" **Multi drugs of abuse urine test this** includes test Benzodiazepine BZD, Cocaine COC, Methamphetamine MET, Morphine/ Opiates MOR300, Marijuana THC and MDMA (Ecstasy) XTC **URGENT Serum** requests can be processed on the same day in Beaumont please contact prior to sending
Toxoplasma gondii	Serum	If sample is a known positive or clinical details indicate positive then the NVRL will refer to Toxoplasma Reference Laboratory, Swansea Paeds <1 month old do not produce IgM If exposure during pregnancy then retest the child every 2 months for 12 months
Transferrin Receptor sTfR	Serum	Spin & Freeze
Tramadol Levels	serum	White Top Tube Spin & Freeze Drug Doze must be included in Clinical Details
Treponema palladium Syphillis	Serum	NONE
Trimethylaminuria TMA Free TMA TMA Oxides	Spot Urine 24hr Acidified Urine	**Adults:** 24 hour acidified urine Freeze 10-20ml urine **Paediatrics:** Spot Urine Add HCL to give pH of <2 0.5 mls for every 10ml of urine. Freeze 10-20ml urine Fish Odour Syndrome.
Trisomy 21	EDTA	2 x EDTA Highlight wild type S65C on form and notify Biomnis before sending. **Needs to go at next available courier as Biomnis refer to France** Must be accompanied by a Biomnis genetics request form which is available online

Test	Samples Type & Volumes	Special Requirements/Information
TTG Tissue Transglutaminase Antibodies Anti Gliadin Antibodies Coeliac Screen	Serum	NONE
Uric Acid- Urate	24hr Plain Urine	NONE
Urine Stone Screen	24 hour Plain Urine	Dr De Freitas Patients
Trichomonas vaginalis	Urine Swab	Aptima Kit
Vanillymandelic Acid VMA	24hr Acidified Urine Spot Urine	**Adults:** 24 Hour Acidified Urine **Paeds:** Spot Urine. The PH must be 2-3, add 0.5ml 4M HCL per 10ml of Urine, HCL to be added within 1 hour of sample given
Varicella Zoster Virus (VZV) (Chicken Pox)	Serum Swab	NONE
Vascular Endothelial Growth Factor VEGF Cytokine	Serum	Spin & Freeze Requires Haematology Consultant Approval
Vasculitis Screen	Serum	Test Includes**:** ANF, ANCA, C3/C4, DNA, and ENA. If ANCA is normal the rest of the Vasculitis screening tests will not be processed.
Steroid Profile Urine	24 hour Plain Urine	50ml 24 hour urine collection Frozen. Please note the total volume on the referral form.
Vasoactive Intestinal Peptide VIP	Aprotinin tube	Spin & Freeze Please note the Aprotinin tubes are available at referrals Laboratory
Very Long Chain Fatty Acids VLCFA	EDTA Lithium Heparin	This test can include: Peroxisomal Studies, Phytanic Acid and Pristanic Acid

Test	Samples Type & Volumes	Special Requirements/Information
Viral Respiratory Culture/Screen	Bronchial Lavage (min 1ml)Gastric Washings SerumRespiratory Fluids Throat, Nasopharyngeal Swab, Sputum, Tracheal AspiratesUrineLymph NodeBlood	Includes: Adenovirus, Coronavirus 229E,HKU1,NL63,OC43, Human Metapneumoniavirus, Human Rhino/Enterovirus, Influenza A & B RNA, Parainfluenza Virus 1,2,3,4 RNA, Respiratory Syncytial Virus, Bordetella Pertussis, Chlamydophila Pneumoniae, Mycoplasma Pneumoniae
Viral Screen	CSF	Includes: Enterovirus, Herpes Simplex (HSV) 1+2 and Varicella Zoster (VZV) DNA If no viruses specified or no clinical details then the sample will not be processed in NVRL
Vitamin A	Serum	Spin & Freeze Protect from light wrap sample in foil
Vitamin B1 Thiamine	EDTA	Freeze sample WHOLE DO NOT SPIN
Vitamin B6	EDTA	Ensure sample is Protected from light, wrap in foil when taking sample. **Freeze sample WHOLE DO NOT SPIN**
Vitamin C Ascorbic	Lithium Heparin	Spin & Freeze Protect from light by wrapping in foil
Vitamin E Alpha Toco Pherol	Serum	Spin & Freeze Protect from light, wrap in foil
Vitamin K Phylloquinone	Serum	White Top Tube Spin & Freeze Wrap in foil to protect from light
Voltage Gated Calcium Channel Complex VGCC	Serum	Test includes:IGI1 and CASPR2
Voltage Gated Potassium Channel Complex VGKC	Serum CSF	If result positive/equivocal tests reflexed are LGI1 and CASPR2
Von Willebrand Screen	Sodium Citrate	**Adults: Citrates x 6** **Paediatrics Citrates x 4** Samples must be received within 4 hours of venesection **spin & freeze by Haematology**. **Test includes:** Factor VIII:C, VWF Antigen, VWF Ristocetin Co-Factor, VWF Collagen Binding, VWF Multimer Analysis, VWF:VIIIB Assay

Test	Samples Type & Volumes	Special Requirements/Information
Voriconazole Levels	Serum	NONE
Weil's Disease Leptospirosis	Serum	NONE
Whipples Disease PCR	BAL EDTA Stool	Tropheryma Whipplei is the main causative agent
White Cell Enzymes Lysosomal enzymes	EDTA	MIN 5ml EDTA Sample must reach laboratory within 72 hours.15 enzymes investigated in screen. If samples received are < 5 ml EDTA Willink will only do enzymes relevant to clinical details.
White Cell Enzymes for Mucopolysaccharides	EDTA Urine	EDTA X 2 Send by Courier same dayIf only Urine Received refer to Metabolic Laboratory in Temple Street
Xanthochromia	CSF (min 1ml) (CSF ample 3 or 4)	Protect the CSF from light, place sample in a labelled brown plastic tube, available in microbiology department Spin CSF immediately, transfer the supernatant a labelled brown tube, refrigerate
Zika virus	Serum Lithium Heparin Urine	NONE
Zinc	Plasma Serum	Not Available For GP's
Zn T8 Antibody	Serum	Serum Familial diabetes trait. Approval required. Refer to Diabetic screen. Part of T1DS
Mycobacterium Tuberculosis Zn Stain Ziehl Nielson Stain TB Culture Nucleic Acid Amplification Testing NAAT	Sputum BAL Urine Tissue Gastric Aspiration CSF Blood Bone Marrow	Early morning sputum (not salivary) sample pre start of treatment required If Bone Marrow special container required - contact referral lab