LMn-GEN-0001 Rev. No. 23	Department of Pathology User Manual	Page 1 of 232 Effective Date: 13/03/2026
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DEPARTMENT OF PATHOLOGY

USER MANUAL

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

Details	Page Number
General updates throughout to improve format and grammar.	Throughout
Update Orla Dowling CMS Haematology; Dr Richard Hinton Consultant Haematologist	13, 14, 15, 45, 61
Add contact details for new Consultant Histopathologist Dr Joseph Houghton; update Dr Ruth Law extension number; Update POCT Manager & Quality Manager mobile numbers; remove outgoing Histo CMS; include referrals email address;	15
Out of hours (8pm-8am Monday to Friday and 24 hours Saturday and Sunday) contact Medical Scientist via Switch	21, 45
Remove Troponin Request Form	24
Add MLL Request Form	24
Clarify process for amending request forms/samples - log in lab needs to be signed, comment will appear in report and NC/NIMS raised.	26
Clarify that requests are rejected if preferred name is used in place of forename/full name	26
Nurses/Midwives in all areas who complete the Venepuncture and cannulation study day are permitted to take bloods. Training records of staff who have completed this study day are retained by Practice Development	28
Added Procalcitonin to Table 8 “Order of Draw”	30
Include information on Fetal D typing	30, 49, 50, 52, 56
Refer to HbS Solubility Test rather than Sickledex	30, 41, 66, 68
Included information on Thrombolysis protocol as it relates to the laboratory	31
Included that unless otherwise specified, samples should be at all times maintained at room temperature or refrigerated between sample collection and delivery to laboratory.	32
Included that, unless otherwise specified, samples should be sent to the laboratory as soon as possible after sample collection.	32
State that max. 1kg may be transported in chute, using designated canisters only to avoid blockage	32
State that turnaround times are monitored on an on-going basis and will be revised as required to ensure that target turnaround times reflect actual laboratory capacity	34
Included information on Laboratory Contingency for Reporting of Results	38
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change All documents relevant to haemovigilance from HP-BB to HP-HV or HI-HV etc.	44-59
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Update Blood Bank sample types: 4.9ml EDTA for ABO/Rh group & screen, antibody investigation 7.5mL EDTA for CFFD referral	44-59
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Included information on requesting, issue and administration of anti-D in Home Births via SECM	44-59
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Update Haematology EDTA sample types Paediatric 1.6ml & Adult 2.7ml; Sodium Citrate Paediatric 1.2 ml & Adult 3ml.	64
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Update to include pregnancy related reference ranges	81
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Remove phenytoin from tests done in-house	89
Update Biochemistry Critical Results to be Phoned to Clinicians (LI-BIO-0012 version 13) • ALP: 10 fold upper limit normal • ALT: 10 fold upper limit normal • Ammonia: >50 • AST:10 fold upper limit normal • CO2: <12 • Remove chloride • CK: >5000 • Creatinine: >300 (>16 yrs , non-pregnant) , >200 (</= 16 yrs or pregnant) • Add in CRP: >300 ((>16 yrs , non-pregnant), > 200 (</= 16 yrs or pregnant) • Direct bilirubin : >25 • GGT: >500 • Glucose: > 15- new patients , 25 - known diabetics , >10 - pregnant women (GTT), ≥ 7.8 - pregnant women (GCT) • LDH > 1000 • Magnesium : <0.4 remove >1.5 • Phosphate: remove >2.5 • Sodium: <120 (or > 5 mmol/L fall in 24hrs) , > 160 (or >5mmol/L increase in 24 hrs). • <130 for age<16 yrs • Total Bilirubin > 300 • Remove triglycerides • Urea: >30 if >16 , >10 if <16 • Uric Acid: >340 • Lithium >1.5 • Cortisol <50 , remove >800 • FT4 >50 • TSH <0.1 , > 50 • Remove Urine Limits • Total bilirubin >300	89
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Update to include clinical area responsibility to ensure unequivocal traceability of histo samples form, patient, by relevant procedures before sending to lab	138-152
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"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: OrlaA.Dowling@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 Haematologist	Dr. Richard Hinton	2086
Consultant Microbiologist	Dr. Martha Trzos-Grzybowska Dr Roisin Connolly	2104
Consultant Histopathologist (Lead)	Dr. Ruth Law	6872
Consultant Histopathologist	Dr. Jane Thorne	2698
Consultant Histopathologist	Dr. Brianan McGovern	2328
Consultant Histopathologist	Dr. Peter Szontagh-Kishazi	2411
Consultant Histopathologist	Dr. Joseph Houghton	6994
Histopathology Registrars Room	*(Rotates)*	2540
Consultant Chemical Pathologist	Dr. Clodagh Loughrey	Via Switch
Laboratory Manager	Mr. Tony Stringer	5771

Position/Area	*Personnel*	*Extension Number*
Blood Bank Chief Medical Scientist	Ms Ciara Dowd	2559
Haematology Chief Medical Scientist	Ms. Orla Dowling	2103
Biochemistry Chief Medical Scientist	Ms Aine Egan	4795
Microbiology Chief Medical Scientist	Mr Haydn Hammerton	2101
Histology Chief Medical Scientist	(Vacant)	2331
Quality Manager	Ms Joanne Duffy	087 3972742
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	087 1655345
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 SpecimenReferrals.OLOL@hse.ie
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 8pm)
- 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.

Out of hours (8pm-8am Monday to Friday and 24 hours Saturday and Sunday), all phone calls to the laboratory from 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***	For the use with Bone Marrow **Aspirates** only
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
ED-HAEM-0105 ***MLL MVZ GmbH Request Form***	As outlined on current version of form, based on tests requested.

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.

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

- Preferred names used in place of Forename on sample/form*
- 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*

* In extenuating circumstances, sample/form details for irreplaceable samples can be amended by the sample taker where the sample taker presents to the laboratory to make the required changes and sign *LF-GEN-0043 Sample Amendment Form/LF-BB-0145 Blood Bank Sample Amendment Form/ QF-HIST-0060 Histology Sample Amendment Form*. In all cases of amended requests, a Non Conformance and NIMS incident will be raised, with a comment included in the test report indicating that the request was amended by clinical representative after initial receipt by the laboratory.

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 at Our Lady of Lourdes Hospital Drogheda to ensure patient safety by avoiding discards of mislabelled samples/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 on NIMS & in Laboratory QMS.

1. BRING COMPLETED REQUEST FORM, REQUIRED TUBES & EQUIPMENT INCLUDING PDA & PDA PRINTER TO PATIENT BEDSIDE
   - Ensure the Request form includes: Full Name, MRN, DOB, tests, requestor, location, fasting status, clinical details, and urgency – all details must be LEGIBLE
   - Use Addressograph labels on ALL COPIES of the Request Form
   - 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 AND LABEL THEM IN THE PRESENCE OF PATIENT AFTER COLLECTION
   - Avoid drip arms, or leave duration of ≥15 minutes after cannula flush before collecting blood samples
   - Using correct venepuncture procedures, collect blood samples* into the appropriate unlabelled tubes, using correct Order of Draw – *(check back of form)*

     Green -> Brown -> Orange -> Red -> Yellow -> VBG
     Good -> Blood -> Order - > Requires -> Your -> Vigilance
   - Use PDAs for all sample labelling AFTER sample collection, in the presence of the patient, as follows:
     - Scan Own ID Badge
     - Scan Patient ID Wristband
     - Print Labels
     - Label Samples and Request Form
     - Discard any extra labels
   - NB Use the PDA at the patient bedside from attached patient wristband only, 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.**

Nurses/Midwives in all areas who have completed the Venepuncture and Cannulation study day are permitted to bloods. Training records of staff who have completed this study day are retained by Practice Development.

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*.

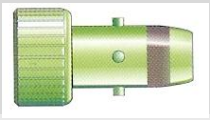
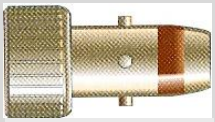
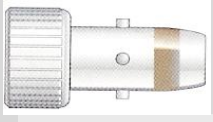
Tube	Tests	Additive	Order of Draw
 COAGULATION	**Haematology** ** **Sample must be filled to line on tube** ** 2.7ml Adult 1.2ml Paediatric PT/INR APTT D-Dimer Fibrinogen Mixing studies (adult only) Anti- Xa (LMWH, Apixaban, Rivaroxaban)	Sodium Citrate	1
 SERUM GEL	**Biochemistry** General chemistry 2.6ml Adult Therapeutic Drugs Antibiotic Levels Endocrinology	Clot activator & Gel	2
 SERUM	**Biochemistry** Paediatric General Chemistry 1.1ml Paediatric 2.6ml Adult Drug Levels Paediatric Endocrinology Antibiotic Levels	Clot activator	3
 LITHIUM	**Biochemistry** Troponin I, Procalcitonin 2.7ml Adult 1.2ml Paediatric Ammonia Paediatric General Chemistry	Lithium Heparin	4
 EDTA (BLOOD TRANSFUSION)	**Blood Bank** 4.9 ml Adult 2.7ml Paediatric 1.6ml Newborn 7.5ml Cord Group & Screen, Crossmatch, Antibody Identification; Phenotype, DCT, Anti-D/anti-c Quantitation; Blood Group 7.5mL Adult Fetal RHD Screen ***only***	EDTA	5
 EDTA	**Biochemistry** HbA1C ESR 2.7ml Adult 1.2ml Paediatric **Haematology** FBC, ESR, Retics, Infectious Mononucleosis HbS Sickle Solubility test, 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 1.2ml Paediatric Glucose Lactate	Fluoride EDTA	8

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

6.16 Thrombolysis Requests

- When patients present with the symptoms of stroke, a rapid response is required in making the decision whether the patient is suitable for Thrombolysis.
- In order for the clinical team to make this decision, the following laboratory tests must be requested and collected as described in this manual to be processed as a matter of urgency:
    - FBC
    - PT/APTT
    - Renal Profile
    - Group & Save
- Post-midnight, the Medical Scientist on-call must be contacted via Switchboard
- Samples must be hand delivered to a Medical Scientist in the haematology department in a Green Pod.
- The person delivering the Green Pod to the laboratory must take a full pod back to the clinical area (available from Haematology).
- The Medical Scientist receiving the samples will take ownership of the samples from receipt to authorisation to ensure that there is no delay in the availability of results.
- Any critical results obtained will be phoned as described in the Haematology and Biochemistry sections of this manual.

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.

Unless otherwise specified in the relevant section/test index of this document, samples should be sent to the Laboratory as soon as possible to avoid specimen deterioration with subsequent inaccurate and possibly misleading results.

Unless otherwise specified in the relevant section/test index of this document, samples should be maintained at room temperature or refrigerated (2-6^{o}C) between sample collection and delivery to the laboratory.

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.

To ensure that the chute does not get blocked for all users:

- A **maximum weight of 1kg** may be transported in a single canister;
- **Chute Canisters (Clear tube with Red ends) only** may be used in the chute. Samples in thrombolysis containers must hand delivered to the haematology laboratory.

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.

Turnaround times are monitored on an on-going basis and will be revised as required to ensure that target turnaround times reflect actual laboratory capacity.

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.

8.9 Contingency

Contingency measures are in place in all laboratory departments to enable service continuity and reporting of results in the event of IT/LIS/Electrical downtime. Details of these arrangements are available from the relevant laboratory departments on request.

8.10 Risk Management in the Laboratory & Communication of Residual Risk

A risk management process is in use in the laboratory to identify and manage potential risks to patient care in the pre-examination, examination and post-examination processes. These risks are assessed and mitigated to the extent possible, and subject to discussion via Pathology Governance.

It is the policy of the laboratory to communicate residual risk to laboratory users as appropriate.

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 a 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.

From 8pm-8am Monday to Friday and 24 hours Saturday and Sunday, 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 Anti-globin 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 & Dr Richard Hinton at #2086 when information is required on relevant clinical issues. Alternatively, contact via the hospital switchboard.

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 Product

All Requests for Blood/Blood products must be made by a clinician with the exception of [1, 2]:

Staff Position	Ward Location	Test Request/Product	Additional Comments Only
Midwives	Midwifery Led Unit	➢ Group & Antibody Screen ➢ Cord Group & DCT	N/A
	ANC	Group & Antibody Screen	N/A
	Labour Ward	Cord Group & DCT Group & Antibody Screen	N/A
AMP[2]	Maternity	➢ Group & Antibody Screen ➢ Cord Group & DCT ➢ Request Anti-D Ig	N/A
Paediatric Staff Nurses	Paediatric Day Ward	Group & Antibody Screen	Oncology Patients Only
ANP	NICU	Group & DCT	N/A
Approved Departmental Nurses	Oncology/Haematology	➢ Group & Antibody Screen ➢ Request RCC & Platelets	Patients with Transfusion Standing Order only
Approved Haematology ANP	Oncology/Haematology	➢ Group & Antibody Screen ➢ Request & Prescribe RCC & Platelets	Under approval & direction of Consultant Haematologist
Pre assessment nurses in LCH & OLOL & 5FDW	Pre-assessment	Group & Antibody Screen only	N/A
ED Triage Nurses	Emergency Department	Group & Antibody Screen only	N/A
Parents of oncology children (shared care with Crumlin)	Paediatric	Group & Antibody Screen only	Oncology Patients Only

Table 11. Blood Product Requesting Exceptions *(Ref LI-BB-0081 Permitted exceptions to clinicians requesting from the blood bank).*

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.

1. **Within the Blood Bank QMS, the requestor is considered to be requesting the test on behalf of the Consultant.**
2. **Registered Advanced Midwifery Practioner can order Anti-D Ig only.**

3.2 Critical Result Notification

The following critical results should all be phoned:

- Clinically significant antibodies detected in pregnancy
- Anti-D quantitation results phoned from the IBTS
- Anti-c quantitation results phoned 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 **4.9 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 **4.9 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-HV-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 4.9ml 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/ 4.9 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".

TEST/PROFILE	SAMPLE/TEST REQUIREMENTS
Investigation of Suspected Transfusion Reaction	Request form for "Investigation of Suspected Transfusion Reaction" and **/ 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 **4.9 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. Ref LI-BB-0041 Process flow for issue of routine ante-natal anti-D Ig (RAADP)***
Issue of Solvent Detergent (SD) Plasma (LG Octaplas)	Request form for "Blood Group and Antibody Screen" and required volume/units of SD Plasma and **4.9 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 **4.9 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 **4.9 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 **4.9 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 **4.9 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 **4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.

TEST/PROFILE	SAMPLE/TEST REQUIREMENTS
Extended RBC Genotyping RHD/RHCE Genotyping-	Test initiated by Blood Bank on specimen for Blood Group and Antibody Screen. Additional **4.9 ml EDTA** sample(s) and request form requested for referral by the Blood Bank as needed.
Fetal RhD Screen (cFFDNA) Referred by Blood Bank	Test initiated by Antenatal Service for RhD Negative Women >11 weeks gestation **7.5mL EDTA**

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 & Crossmatch
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	Routine- Same Day Urgent- 60 minutes 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: - *Requests outside routine hours* - *Irregular or multiple antibodies detected and if the patient has specific blood requirements*	

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

To ensure that an <u>urgent</u> 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	<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-0417 Blood /group Genetics User guide* pg. 20 Turn Around times
Fetal RhD Screen	*ED-BB-0417 Blood /group Genetics User guide pg. 19- target 14 days*

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 group O 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 an emergency situation whereby only 1 sample is available Group O RED CELLS and group AB/A plasma may be issued until a second sample is received and processed
4. ** In the event that ABO Rh D identical platelets are unavailable, an alternative suitable group may be issued. 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 group O Red Cells 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:
  - 4.9ml Sarstedt EDTA Sample – Adult
  - 2.7ml Sarstedt EDTA Sample – Paediatric
  - 7.5ml Sarstedt EDTA Sample – Cord Blood
  - 1.6ml Sarstedt EDTA Sample – Newborn
  - 7.5mL EDTA Sample-Adult(Fetal RHD Screen only)

- 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* must 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* must 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-HV-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 **where an authorised G&S result is available on Ward Enquiry**.
- Check Ward Enquiry -> (defaults to search 6 months - set dates to search past 10 years).
  - Current Valid sample received & a historic blood group is on system: a 2nd sample IS NOT required;

- No current valid sample but a historic blood group is on system: a 2nd sample is required.
- No current valid sample & no historic blood group: 2 samples are required from 2 **separate phlebotomy episodes**.

- 2nd samples must be from a different phlebotomy episode – i.e.
  1) Drawn >30 minutes after the 1st sample.
  2) New Blood Bank Request Form (fully-completed).
  3) 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

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
Crossmatch 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.
Crossmatch 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, preferably < 72 hour, but acceptable up to 7 days old.

Test/Profile	Requirements for Further Testing
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.

All RhD Negative women>11 weeks with no allo anti-D should have Foetal RHD screen performed (with the current exception of certain patients of African ethnicity due to crossover of certain DNA sequences with the test material). The Fetal RHD Screen is designed to determine the RHD type of cell-free DNA in maternal peripheral plasma. It is to be used as a guide for administration of prophylactic anti-D (for all Potential

Sensitising Events, and second trimester Routine Antenatal Anti-D Prophylaxis (RAADP)).

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.

8.6 Home Births

- In the event that a homebirth via a self-employed community midwife (SECM) service is approved by maternity services, a letter confirming the patient details is sent to the Blood Bank Chief Medical Scientist and the Haemovigilance Officer(s). The patient history is checked to ensure that the patient has a booking blood on file and no obvious reason that would delay the provision of blood in an emergency. The letter is filed in the Blood Bank diary at the expected date of delivery.
- The SECM must liaise with the Haemovigilance Officer to complete haemovigilance education regarding taking and labelling of Blood bank Specimens, collection administration and traceability of IgG Anti-D Ig.
- If a patient approved for homebirth is RhD negative, a sample must be referred for CFF DNA >11 weeks gestation, as for all RhD negative antenatal patients. This will indicate if the foetus is RhD positive or negative, or results may be inconclusive.
- If the patient is carrying an RhD positive foetus, or results are inconclusive, Anti-D Ig prophylaxis will be required at 28 weeks gestation through the Maternity Day Unit as for all such patients. Anti-D Ig will also be required for any potentially sensitising events during the pregnancy through the ED or LW as appropriate relevant to gestation.
- A cord blood must be taken at delivery for all homebirths involving RhD Negative patients. The SECM must liaise with the ED clerical officer to obtain a medical record number for the baby and all Blood Bank sample acceptance criteria must be met. Reports are issued to the LW. If a cord blood sample cannot be taken or is unsuitable for processing, the baby must be brought to the post-natal ward, Unit 2, to have a venous blood sample taken by a paediatric NCHD, to be sent for new-born blood group identification. The SECM must arrange this with the CMM 2 or the Midwife in charge of Unit 2.
- If the cord blood testing confirms that the infant is RhD positive, Anti-D Ig must be administered to the mother. Again, the SECM must liaise with the Labour Ward to organise Anti-D Ig prescription, ordering and collection. A group & screen sample and request form must be sent to the Blood Bank (unless there is a valid sample, i.e. < 72 hours, already on file). All Blood Bank sample acceptance, collection, transfusion & traceability criteria must be met. Reports are issued to the LW. The traceability label must be completed and returned to the Blood Bank ASAP.
- An Acid Elution Test must also be sent to the Haematology Laboratory and additional Anti-D Ig requested and administered as required in the event of a positive result.
- Should any issues or queries arise, contact the SECM detailed in the original letter received or:
    - Designated Midwifery Officer for Homebirths/ ADOM for Community Midwifery
    - 041-9837601 Ext 2024
    - Mob: 0871009125

- Refer to

- *ED-BB-0145/OLOLH-DEP-OBS-002 the administration of Anti-D Immunoglobulin, HSENE Regional Clinical Practice Guidelines, Ref: RCPG 019,* available on the Hospital Q Pulse.
- *ED-BB-0236 /RCSI-EXT-NAT-116 Clinical Practice Guideline The Use Of Anti-D Immunoglobulin For The Prevention Of RhD Haemolytic Disease Of The Newborn Institute of Obstetricians & Gynaecologists Royal College of Physicians of Ireland, June 2012*, available on the Hospital Q Pulse and on www.hse.ie under Clinical Guidelines.
- *OLOLH-DEP-HV-051 / HP-HV-0001 Requesting from the blood bank.*
- *OLOLH-DEP-HV-052 / HP-HV-0002 Collecting from the blood bank.*
- *OLOLH-DEP-HV-053 / HP-HV-0003 The administration of blood products.*

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 Orla Dowling	2662	041 9837601 ext. 2662

Table 20: ***Contact Details***

2. HAEMATOLOGY TEST INDEX

2.1 Urgent/ Routine Haematology Tests

All haematology samples should be, at all times maintained at room temperature or refrigerated after sample collection (ensuring sample collection tubes in date, proper phlebotomy procedures adhered to).

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.

Thrombolysis samples are deemed urgent. Following sample collection, these samples are kept at room temperature and immediately hand-delivered to the scientist working in Haematology, who will process them.

Samples for thrombophilia screen, lupus anticoagulant and factor assays must be received in the laboratory by 15:30 Monday to Friday for sample handling and storage prior to transport to external referral laboratories.

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 (if urgent) <24hrs (if routine) <96hrs Consultant	-
HbS Sickle Solubility test		<48hrs	<24hrs	-
Infectious Mononucleosis Screen		<72hrs	<24hrs	-
Malaria Screen		2-4hrs for thick/thin films (as per BSH guidelines) <48hrs for antigen test	<2hr (during routine hours) <24hrs (out of hours)	Cut-off is 8pm for same day film; Malaria Antigen only after 8pm (5pm weekends/bank holidays) N.B. Patient must have had travel to a malaria endemic area and the country of travel stated on request form
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		<8hours	<2hrs	Must be filled to green line Must provide Wells Score for VTE related requests Note: D-dimer testing only available on in-patients, with the exception of LCH patients & Respiratory/ Haematology OPD patients. Not available to GP's.
Mixing Studies		<4 hours -APTT <24 Hours - PT	<24hours	Must be filled to green line
Anti-Xa (Low Molecular Weight Heparin LMWH, Apixaban, Rivaroxaban)		<24hrs	<2hrs (urgent) <8hrs (routine)	Must be filled to green line. Must contact Consultant Haematologist for approval. Test performed only during routine hours (8am-8pm weekdays, 9am-5pm weekend/bank hols)

Clinical details are required for all coagulation requests. If 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
HbS Sickle Solubility Test – For Urgent Theatre only
Infectious Mononucleosis Screen
Malaria Screen (Full screen including thick/thin films between 8am-8pm weekdays, 9am-5pm weekends and bank hols-antigen test **only** out of hours
PT/INR
APTT/Ratio
Fibrinogen
D-Dimer

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

2.3 Haematology tests during laboratory downtime

In the event of laboratory downtime due to issues such as L.I.S. /IT failures, staffing etc. the Haematology contingency plan will be implemented. Expectations regarding Haematology test reports depends on the nature/ severity of the issue. For serious/prolonged issues **ONLY** urgent samples will be processed. The following wards will be contacted and informed of the issue: ICU/HDU, A&E, Paeds ED, AMAU, CCU, Oncology, Labour Ward. A provisional paper report may be issued or verbal report. A printout of reference ranges will be sent to the ward. Routine samples will be tested when disruption/issues are resolved.

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’.

1.2 Coagulation Request Criteria

If clinical details are not provided on the request form**,** your request will not be processed. See list of indications for coagulation testing above (Section 2.1)

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:

Haemoglobin	< 7.0 g/dL & >19.0g/dL (1st Time)
Platelets	< 50 $x10^9$/L & >1000 $x10^9$/L (1st Time)
White cell count	<1.0 $x10^9$/L & >35.0 $x10^9$/L
Neutrophils	< 1.0 $x10^9$/L & > 50$x10^9$/L (1st Time)*
Prothrombin time	> 20 seconds if not on anti-coagulant therapy
INR	> 5.0
APTT	>50 seconds (if not on heparin) Prolonged results in boys <16yrs old ≥100 seconds if on heparin
HbS Sickle solubility screen	Positive
ESR	Phone result when clinician querying Temporal Arteritis.
Fibrinogen	<1.5 g/L
Morphology	New Acute Leukaemia, TTP, MAHA
Infectious Mononucleosis	Positive **
Malaria	Positive
Kleihauer	All Positive Phone Consultant Haematologist and Consultant Obstetrician when ≥8mL FMH
Discarded Samples	Discarded samples for acute clinical areas (Paeds A/E, NICU, LW, Haem/Onc)

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.

Any and all difficulties encountered in notifying the patient's clinical team of critical results, must be raised as a non-conformance for review at the next quality meeting.

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

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turn Around Time (NWD)*
Bile Acids	Blood Serum	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	Serum Gel Serum	4.9/2.7ml 1.1ml (Paed) 1.2ml (Paed)	Brown Top Tube White Top Tube	NWD
Bicarbonate	Blood Serum	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 Yellow Top Tube	Fluoride EDTA	4.9/2.7ml 1.2ml (Paed)	Yellow Top Tube Yellow Top Tube	Same day
Amylase	Blood Serum Li Heparin	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 Li Heparin	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 Li Heparin	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	3 days
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	Serum Gel Serum	4.9/2.7ml 1.2ml (Paed)	Brown Top Tube White Top Tube	Same day
Osmolality	Blood Serum Li Heparin	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

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turn Around Time (NWD)*
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

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turn Around Time (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)
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

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turn Around Time (NWD)*
Protein/Creatinine Ratio	Random urine 24 hour urine	None	10-20mls Urine voided in 24 hr period	Universal Container 24 hour Container	Same Day
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	
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	**Valproate (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. 13*

Analyte	Less than	Greater than	Notes
Serum/Plasma Chemistries			
ALP (IU/L)		10-fold upper limit of normal	
ALT (IU/L)		10- fold upper limit of normal	Phone all elevated results in pregnancy
Amylase (U/L)		300	If amylase is blocked out due to icterus – a urinary amylase can be suggested for analysis.
Ammonia (µmol/L)		50	Confirm sample type and receipt time of sample.
AST (IU/L)		10- fold upper limit of normal	Phone all elevated results in pregnancy
Bicarbonate (E/L)	12		Sample must be analysed within **15** minutes of first removal of cap.
Bile Acids (umol/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 (Corrected Calcium is not reported on these patients) or if Albumin is >40.
Corrected Calcium (mmol/L)	1.80	3.2	If significantly low, and K raised, consider sample EDTA contamination. (Mg will also be low)
CK (IU/L)		5000	
Creatinine (µmol/L)		350 (aged > 16 yrs) 200 (16 yrs or < 16)	On first occurrence only. No need to phone in known CKD.
CRP (mg/L)		300 (> 16yrs, non-pregnant) 200 (16 yrs or < 16 or pregnant	
Direct Bilirubin (µmol/L)		25	Neonates only
GGT (IU/L)		500	Phone all elevated results in pregnancy
Glucose (mmol/L)	2.5 2.7	15 - new patients 25 - known diabetics >10 - pregnant women (GTT) ≥ 7.8 - pregnant women (GCT) - 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
Lactate (mmol/L)		All results >normal range	Confirm sample type & receipt time. Lactate is available on blood gas analysers.
LDH (IU/L)		>1000	Phone all elevated results in pregnancy

Analyte	Less than	Greater than	Notes
Magnesium (mmol/L)	0.4		
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)	2.5	6.0 serum and plasma 6.5 serum/plasma 6.0 serum/plasma 5.5 serum/plasma	If K is elevated – check for pseudohyperkalaemia - Check age of sample. Add flag O for old (if unspun for 24 hrs). - Haemolysis during venepuncture - Prolonged tourniquet application prior to venepuncture - Thrombocytosis (High plts - check plasma - Check sample type - Check for contamination (see calcium abo ***Contact OLOL medical reg. with Dr De Freitas Patients.*
Phosphate (mmol/L)	0.3		If elevated significantly check date. If unspun for 24 hrs hours add O flag.
Procalcitonin (ng/ml)		2.0	
Sodium (mmol/L)	120 (or > 5mmol fall in 24 hrs) 130	160 (or >5mmol/L increase in 24 hrs)	If unchanged (or improved) from previous, no need to phone. If sodium is significantly increased in conjunction with low urea, creatinie, total protein, and albumin - enquire if the sample was taken from a drip site. Age < 16 yrs
Total Bilirubin (µmol/L)		>300	Phone in neonates only.
High Sensitivity Troponin (ng/mL)		First elevated result within 2 weeks	Also phone if marked elevation in results from previous
Urea (mmol/L)		30 if > 16 yrs >10 if 16 or <16 yrs	First occurrence only
Uric acid (mmol/L)		340	On pregnant women only

Analyte	Less than	Greater than	Notes
DRUGS			
Digoxin (/L)		2.5	
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)		1.5 mmol/L	
Paracetamol (mg/L)		All results > therapeutic range	
Phenytoin (µmol/L)		25	
Salicylate (mg/L)		All results >therapeutic range	
Vancomycin (mg/L) Trough level (Pre-Dose) Peak Level (Post Dose)		 20 40	Phone the ward only.
HORMONES			
BHCG (ng/mL)		Elevated	Only on a patient on Roaccutane
Cortisol (ng/L)	50		Always check request form before authorising cortisols (enter in internal NPD that form checked)
Prolactin (mU/L)		>1500 >3000 (Dr Ahern patients only)	Macroprolactin is required when the prolactin result is > reference limit and only when a macropro 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
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, the following comment: 'Sample blood-stained, please interpret with caution' will be included in the test report
Unsuitable, Contaminated, Insufficient Or Any Discarded Samples			Phone all **critical discards from** **-** ED - NICU - urgent GP paediatric/OPD
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. Check if tests can be added to a plasma samples.

6. REFERENCE RANGES

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

- *LI-BIO-0076 Biochemistry Reference Ranges Rev. No. 4*

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	
Alk Phosphatase		191 - 450	4-6 yrs	Male	

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
ALT	**IU/l**	20-54	1-7 days	Male	Serum/Plasma
ALT		24-59	8days-12 mths	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	

Analyte	Units	Reference Range	Age	Sex	Sample type
ALT		22-61	8days-12 mths	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
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

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
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

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
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			

Analyte	Units	Reference Range	Age	Sex	Sample type
		1mg. Overnight dexamethasone suppression test: Normal response is a serum cortisol <= 50nmol/l			
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)			
		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	

Analyte	Units	Reference Range	Age	Sex	Sample type
		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		
		9.0-19	>/= 19 years		
Gamma GT	**IU/l**	23-174	1-30d	Male	Plasma/Serum
Gamma GT		16 -147	1-3 mo	Male	
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	0 – 28 days	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
		babies who received gentamicin 24 hourly and 36 hourly.			
		< 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
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

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
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	
Lactate	**mmol/L**	0.5-2.2	All	All	Plasma

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
		Post-menopausal without HRT: 5.16-61.99 U/L		All	
		Male:0.57-12.07 U/L		All	
Lithium	**mmol/L**	Target range : 0.4-1.0	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
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

Analyte	Units	Reference Range	Age	Sex	Sample type
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
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	

Analyte	Units	Reference Range	Age	Sex	Sample type
Phosphate		0.90-1.55	<15	Female	
Phosphate		0.80-1.55	<18	Female	
Phosphate		0.74-1.52	>18	All	
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.	-		

Analyte	Units	Reference Range	Age	Sex	Sample type
		- 2 to <10 ng/ml: Systemic bacterial infection is likely. - >=10 ng/ml: Systemic bacterial infection is highly likely.			
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+		
Rh Factor	**IU/ml**	<30	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
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	
Uric Acid		155-357	neonate	Female	
Uric Acid		119-327	29days to 18 years*	all	
Urinary Calcium 24 hr	**mmol/24hrs**	2.5-7.5	All	All	Urine

Analyte	Units	Reference Range	Age	Sex	Sample type
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 potassium	mmol/24 hours	25-125	All	All	Urine
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

Analyte	Units	Reference Range	Age	Sex	Sample type
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
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 -	All	All	Urine

Analyte	Units	Reference Range	Age	Sex	Sample type
		'Interpret with plasma osmolality, plasma sodium, urinary sodium and renal function. Contact the Biochemistry Department on 4795 for further 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	346.5 – 693	All	All	Serum

Analyte	Units	Reference Range	Age	Sex	Sample type
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
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 (Table 28a, below). If the analyser is malfunctioning in a particular area, contact the Point of Care Manager (mobile: 087 1655345; email: 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 (Table 28b, below).

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 28a. ***Blood Gas Analysers***

Floor	Area	Back-up	Alternative
Ground Floor	Emergency Department (Resus 1) ext. 2679	Emergency Department (Resus 2) ext. 8431	Emergency Department (Green) ext. 8431
Level 1/ Ground Floor	Newgrange Level 1 (NGL1) ext. 8300	Laboratory (Biochemistry) ext. 4795	Emergency Department (Green) ext. 8431
4th Floor	Intensive Care Unit (ICU) ext. 5780	High Dependency Unit (HDU) ext. 5781	Newgrange Level 4 Theatre (NGL4) ext. 8435
5th Floor	BL5PU Paediatric HDU ext. 2131	High Dependency Unit (HDU)	

Floor	Area	Back-up	Alternative
		ext. 5781	
Maternity	Labour Ward (LW) ext. 2122	Special Care Baby Unit (SCBU) ext. 4613	
Louth County Hospital	Louth Medical 1 Ward	N/A	N/A
Drogheda Cottage Hospital	Oxygen Clinic, Contact O2 Clinic via Switch	Emergency Department (Resus 1) ext. 2679	

Table 28b. ***Blood Gas Analysers – contingency***

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

Specimen containers are outlined in Table 30a, below. Points of note in relation to new specimen containers are outlined in Table 30b.

Container Type	Specimen Type
Universal Container-Yellow Top 70mls	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 30a. ***Microbiology Specimen Containers***

Patient Urine Collection ONLY

- **DO NOT SEND ANY** sample in the clear collection cups (Fig. 1) as these are prone to leakage
- 10mL Boric Acid Green (adults) or 3.2mL Boric Acid Yellow (paediatrics) containers must be used for all **MICROBIOLOGY URINE** specimens (Fig. 2 & Fig. 3)
  - Re-cap the container with the green cap (they are prone to leakage without it)
  - Use small patient labels
- 70mL containers are no longer accepted for microbiology urine samples (Fig. 4). However, these 70mL containers must be used for non-urine microbiology samples (faeces, fluid and fluid) and for urine and fluid samples for biochemistry. These sample types cannot be tested if received in green or yellow Boric Acid containers.

Table 30b. ***Microbiology Specimen Containers – points of note***

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

It is the responsibility of the requesting Clinician to follow up on the result.

1.2 Materials Supplied by Histopathology Laboratory

The following are available from Cellular Pathology Specimen Reception (Ext 2331.

- Specimen containers – various sizes
- 10% neutral buffered formalin in pre-filled 40ml containers
- CytoLyt preservative

Test request forms are available from the Histopathology department (via stores

1.3 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**	6872
Consultant Histopathologist **Dr. Jane Thorne**	2698
Consultant Histopathologist **Dr. Brianan McGovern**	8469
Consultant Histopathologist **Dr. Peter Szontagh-Kishazi**	2411
Consultant Histopathologist **Dr. Joe Houghton**	6994
Histopathology Registrars Room	2540

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

1.4 Conferences

The following conferences occur on a regular basis as part of Our Lady of Lourdes Hospital Multi-Disciplinary Meetings:

Type of Conference	Location
Dermatology	MDT's may take place on site or cases from OLOL will be sent out for discussion at MDT's in other hospitals.
GI Oncology	
Benign GI	
Colposcopy	
Cervical Check	
Thyroid	
Head & Neck/ENT	
Upper GI	
Lower GI	
Urology	
Lung	
Breast	
Gynae	
Sarcoma	
HPV	
Liver	
NET	
HCC	
Plastic Surgery	

Table 36b. ***Histology Conferences***

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

When we are unable to provide a request or required follow-on analysis, we will attempt to source a referral laboratory, to which specimens may be sent. We welcome input from interested clinicians in this process. The choice of laboratory is primarily based on quality grounds, with accredited laboratories being chosen preferentially. Other factors such as cost and turnaround times are also considered. All referred histopathology is either referred by the Consultant Histopathologist or the Consultant Oncologist only. The responsibility for sending specimens lies with the external centre (Sender).

Test Referred	Referral Centre	TAT's (approx.)	Specimen Type
Direct Immunofluorescence (DIFS)	Mater (immunology)	21 days	Fresh skin punch snap frozen
Placenta	Rotunda	6-8 weeks	Formalin Fixed
IHC	Beaumont Hospital IHC	The turnaround time of specimens will vary depending on the nature of the specimen and the complexity of the investigations required. The following is an outline of estimated turnaround times for different specimen types from time of receipt in the laboratory:	Unstained Slides
		Histopathology IHC or ISH 5-10 days HER2 IHC testing 10-15 days Histopathology (referred to external institute) 20 days	
	Coombe	10 to 20 working days	
	Crumlin	10 to 14 days	
	RVH Belfast	https://belfasttrust.hscni.net/wpfd_file/cellular-pathology-user-manual/	
		The concept of fixed turnaround times for all histopathology specimens has been superseded by a requirement that reports are available for timely clinical decision making, as outlined in "Key assurance indicators for pathology services" (RCPath document G181, November 2019). This can be agreed between relevant clinical teams and the laboratory and monitored by regular audit.	
	SJH	user manual states "varies depending on specimen types"	
	SVUH	5 – 10 days depending on IHC request and referral centre	
	TUH	20 working days	

Test Referred	Referral Centre	TAT's (approx.)	Specimen Type
Molecular	Beaumont Hospital Molecular	Turnaround Times for Results (TATs) The turnaround time of specimens will vary depending on the nature of the specimen and the complexity of the investigations required. The following is an outline of estimated turn-around times for different specimen types from time of receipt in the laboratory:	Routine Histology Block (Formalin Fixed, Paraffin Embedded Specimen)
		Solid tumour mutation analysis 15 days Document Number: ALK & ROS1 FISH testing 15 days	
		Microsatellite Instability analysis (MSI) 20 days MLH1 Hypermethylation analysis 20 days	
		BRCA 1&2 testing (including MLPA) 48 days HRD testing 48 days	
		HRD testing 48 days Neuromolecular testing (aCGH, MGMT, BRAF fusion, IDHSeq, DMET. NGS) 42 days	
	CMD Lab SJH	10 to 15 days	
	Poundbury	PIK3CA – (breast) 2-4 days HER2 -2-3 days (+24hrs for DDISH) MMR IHC – 2-3 days PD-L1 (pembro/nivo)- 2-3 day	
Specimens	HTS	10 days	GP specimens/In-house
2nd Opinion/Peer review/MDT		LI-HIST-0003 Approved List of Consultants	Routine Histology Block Slides

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

Please Note: this is not a definitive list and is subject to change. When the lab is unable to provide a request or requires follow-on analysis, we will source a referral laboratory, to which specimens may be sent. The Turnaround times was taken from the referral laboratory's user manual/website.

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 Formalin is a class 1 carcinogen and users need to be aware of the health hazard. (Note: MSDS available upon request from the laboratory or on the Serosep website)
- 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

The following is a guideline on the requirements of the various specimen types and the appropriate way they should be delivered to the laboratory. This ensures the integrity of the specimen for laboratory investigations

Tissue Type	Fixative	Comment
Routine Histology		
Samples for routine Histopathology (except for Frozen Sections, Skin DIF'S and Non-Gynae Cytology Samples	10% formalin 	Pre-filled 40 ml/250ml/350mls 10% neutral buffered formalin pots 10L formalin polycubes are available in the formalin storage area of the laboratory.
Biopsies or skin punches/tags, nevus's etc.	10% formalin Smaller 40ml (red-lidded) pots	Available from laboratory

Tissue Type	Fixative	Comment
		
Specimens such as placenta, colon or small bowel etc.	Larger 2.5 and 5 litre containers/buckets 	Buckets are available from Histopathology.
Note: • 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. • Multiple samples from a patient MUST be labelled on the sample container with the number and sate the site of tissue on each		
Cytology		
Bronchial brushings	CytoLyt 	available from the laboratory
Fluid Cytology (Urine)		Available from the lab

Tissue Type	Fixative	Comment
Fluid Cytology samples (such as Urine, Serous Effusions, Bronchiolar Lavage BAL's, Bronchial Washings etc.)	No fixative Place material in an MSU container. e.g. 	available from the laboratory
Fine Needle Aspirates	Received pre-made on slides clearly labelled with the patient's details in pencil as either Air-Dried (AD) of Spray Fixed (SF). 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.)	
CSF	Specimen must be collected in an MSU container.	

Tissue Type	Fixative	Comment
		
Note: • 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. If they are, they should be placed in the fridge in the main specimen reception. This ensures the specimen integrity.		
Other		
Placenta	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.
Skin for DIF.	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
Note: 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		
Frozen Sections	Samples must be sent fresh in a dry/sterile appropriately labelled container.	•Frozen sections must be pre-booked with the Histopathology Laboratory at Ext 2331.

Tissue Type	Fixative	Comment
		•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. •Please write a contact number on the request form for the telephoned report.
Muscle Biopsies Special Requirements	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	• 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. • Please contact the laboratory if the procedure has been cancelled. •Deliver the appropriately labelled specimen to the laboratory immediately
Post-mortem/Autopsy		Please contact the Consultant Pathologists directly regarding Post Mortems Procedures and Policies.

3.3 Compromised Samples

Where compromised samples (e.g. specimen received with no formalin) are accepted the final report will indicate the nature of the problem and if applicable that caution is required when interpreting the results.

3.4 Urgent Specimens

Urgent specimens are dealt with on an individual case basis. The request form for an urgent case must be clearly marked by ticking the urgent box, and the clinical details must reflect the reason for urgency. It is the responsibility of the requesting clinician/clinical team to follow up on the result. A phone or bleep number should also be provided so that the urgent report can be communicated. Failure to provide these details may result in the sample being processed as routine.

If a sample that has been already sent to the laboratory subsequently becomes urgent, the laboratory should be contacted (ext. 2331/2314) clearly outlining the reason as to why the status of the specimen has changed, consultation with the appropriate consultant Histopathologist may be required.

4. Turnaround Times

4.1 Routine Turnaround Times

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This is only a guideline and the complexity of a case and the requirement for further investigations may lengthen the turnaround time. Turnaround times (TATs) can be impacted by resource issues. These target turnaround times have been agreed following consultation with the users of our service. Turnaround times are continuously monitored and may need to be revised at times. Any adjusted TATs will be communicated to users by memo. In addition TAT's are routinely monitored as part of the National Histopathology Quality Improvement Programme.

Sample Type	Turnaround Time
P01 - Small Biopsies	<12 working days
P02 - G.I. Endoscopic Biopsies	<12 working days
P03 - Large Cancer Resections	<12 working days
P04 - Non-Biopsy Other	<12 working days
P06 - Non-Gynaecological Cytology – FNA	<5-7 working days
P07 - Non-Gynaecological Cytology – Exfoliative	<5-7 working days
Case may be referred for 2nd opinion/special stains or Immunocytochemistry which adds to the TAT**	
Frozen Sections	20 minutes initial report Final Report 2-4 days
Consultant Pathologists are happy to discuss reports at any stage	

Table 39. ***TAT Histology***

Note: Overuse of the urgent service will adversely affect the turnaround times.

4.2 Turnaround Times of Referred Tests

The turnaround time of specimens sent to a referral centre varies depending on the nature of the specimen and the complexity of the investigations required. The laboratory monitors the turnaround times of the referral centres to ensure they are acceptable.

5. SAMPLE ACCEPTANCE/REJECTION

As discussed in the general section "Sample Acceptance/Rejection Policy", above, the Histology department is like 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, site on each pot) • Right or Left (if multiple specimens)	• **Full Name (No abbreviations)** • **Date of Birth or MRN** • Source • Patient Address • Requesting Consultant/GP • Clinical details (if relevant) • Test request	• Date of specimen collection • Specimen Type • Right or Left (if relevant)

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

Samples should be clearly labelled with at ***least 2 critical identifiers*** patient and specimen details. The ***requesting clinician*** must also be identified. 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.

5.1 Sample acceptance exceptions

In exceptional circumstances, when a request would under usual circumstances be rejected, if the sample is clinically critical or irreplaceable (for example, surgical specimens/ biopsies, CSF,) senior Laboratory staff together the clinician may agree to proceed with processing the request. The laboratory has a policy that considers best interests of the patient in receiving care, when a sample has been compromised due to

1) incorrect patient or sample identification,
2) sample instability due to, for example, delay in transport,
3) incorrect storage or handling temperature,
4) inappropriate container(s), and
5) Insufficient sample volume.

When a compromised clinically critical or irreplaceable sample is accepted, after consideration of the risk to patient safety, the final report will indicate the nature of the problem and where applicable, advising caution when interpreting results that can be affected.
The validity of results requires adherence to these guidelines.

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.

The validity of results requires adherence to pre-analytical sample guidelines as outlined in the User Manual, together with correct sample storage and transport conditions.

6. SAMPLE RETENTION

The Histopathology and Cytology Departments retains Specimens, Blocks and Slides in accordance with the Royal College of Pathologists Guidelines (Royal College of Pathologists and Institutes of Biomedical Science. The retention and storage of pathological records and archives, 6th Ed 2024. Available from: www.rcpath.org). Storage of examined histopathology specimens is as follows:

1. For ***surgical specimens from living patients***, keep for 4 weeks after issue of final report. For cases in which a supplementary report is anticipated after additional investigations (such as molecular genetic tests or referral for expert opinion), which may occasionally exceed arrangements should exist to ensure that individual specimens are retained until the additional report has been finalised.
2. ***For post-mortem specimens***, appropriate consent for a scheduled purpose under the Human Tissue Act 2004 must have been obtained if any retention (other than that legitimately authorised by the Coroner or Procurator Fiscal) is to be legal. The terms of that consent must be complied with in relation to storage and use.
3. ***For Cytology*** Keep for 48 hours after the final report has been issued by the laboratory, unless sample deterioration precludes storage. Samples that are easily and non-invasively repeated, such as most urine samples, may be destroyed once the examination is concluded and the final report has been authorised. Reference laboratories receiving all or part of a specimen of this sort from another laboratory should follow the same guidance.
4. ***Paraffin wax or resin embedded blocks*** for histology storage for at least 30 years is recommended, if facilities permit
5. **Frozen tissue** for immediate histological assessment (frozen section) Stained microscope slides should be kept as described below for sections from fixed

specimens. Residual tissue should be processed as a normal, fixed specimen once the frozen section is complete.

6. ***Stained slides*** appropriate retention times depend on their nature and purpose.

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.

7. RESULTS

Results can be obtained from the Histopathology office, ext. 4661/2482. The Consultant/NCHDs can be contacted to discuss individual patients. A Histology preliminary report will be issued if the sample has been sent out for further testing or second opinion. Results from referral centres will be scanned into the original report. The Clinician stated on the request form receives the report. For correct report destination the Clinicians name must be legible.

7.1 Requesting Additional Examinations

Users may request additional examinations on specimens already sent to the laboratory. Additional requests may be made verbally over the phone. The analysis will be performed provided the specimen has been stored appropriately and there is sufficient specimen remaining to perform the additional tests. The time limit for the addition of tests for each department is given below.

7.2 Communication of critical results

Significant Unexpected Results - These are cases where the pathologist has concerns that histopathology findings are clinically significant for the patient and will be unexpected. The decision will require professional judgement on the part of the pathologist and should be made in conjunction with the clinical details on the request form.

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.

All queries in relation to referred tests should be made to: SpecimenReferrals.OLOL@hse.ie

Table 42. Tests Referred from Our Lady of Lourdes Hospital Drogheda and Sample Types, Volumes and Special Requirements. *(Ref. LMN-REF-0001 version 7)*

Tests	Sample Type & Volume	Special Requirements	Referral Lab
5HIAA (5- hydroxyindoleacetic acid)	24 hr Urine – with HCl pH & volume noted, or Serum, or Spot Urine	24hr urine - adults only Serum - spin & freeze Spot Urine- Paediatrics Add 0.5ml HCL per 10ml Urine < 1 hour, 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.	Eurofins Biomnis South Manchester Beaumont (Bio)
16S rRNA	EDTA Blood Joint Fluid Pleural Fluid	Minimum 0.5ml. Request form must be filled out. This can also be sent to Eurofins Biomnis consult online manual before sending.	Colindale London
17 Hydroxy Progesterone (17OHP) Adult	Serum	No special requirements for adults. Paediatrics ONLY Spin & Freeze Not relevant in children <3 days old due to maternal hormones	Eurofins Biomnis Crumlin
21 Hydroxlase	Serum	Spin and Freeze < 4 hours. This can also be sent to Eurofins Biomnis consult online manual before sending.	Sheffield
Adrenaline	24 Hour Acidified Urine Collection	.	Beaumont

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Acetylcholine receptor antibodies (ACHR)	Serum EDTA	Minimum 1ml non Haemolysed Serum or EDTA Plasma FROZEN This can also be sent to Eurofins Biomnis consult online manual before sending.	Eurofins Biomnis
Acylcarnitine (Includes Free Carnitine Screen)	Blood spot or Lithium heparin on Guthrie Card	Only URGENT samples sent to Metabolic Lab Temple street by prearrangement with Consultant. All developmental delay and query autism requests are sent to Biomnis Must be air dried for minimum 2 hours	Temple Street Eurofins Biomnis
Activated Protein C Resistance (APCR)	Sodium Citrate x 6 EDTA x 2 Serum x 1	Spin, separate and freeze sodium citrate and serum within 4hrs. Part of thrombophilia screen, separate request form must be completed	NCHCD St James Crumlin
Adalimumab	Serum	White Top Tube - Spin & Separate sample Request form must state Trough / Peak. This can also be sent to Eurofins Biomnis consult online manual before sending.	Birmingham

Tests	Sample Type & Volume	Special Requirements	Referral Lab
ADAMTS-13 Activity Assay Thrombotic Thrombocytopenic Purpura (TTP)	Sodium Citrate x 2	This test needs Haematology approval Must be received in Belfast in <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 Eurofins Biomnis or First Direct	Belfast
Adenosine Deaminase	Pleural Fluid Serum Ascites Fluid CSF		Eurofins Biomnis
Adenovirus	BAL Stool Throat Swab CSF Urine Serum	For PCR samples, EDTA required, sample spin and freeze	NVRL
Adrenal Antibodies (ADRA)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont (Bio)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Adrenocorticotropic Hormone (ACTH)	EDTA + Aprotonin	Frozen <4 hours Adult Cortisol levels to be checked and only refer if cortisol >500nmol/L. Paeds levels automatically sent out.	Eurofins Biomnis
Alcohol (Ethanol)	Fluoride Oxalate Spot Urine	Samples must be taken within 24 hours of ingestion. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont(Tox)
Aldolase	Serum	Spin & Refrigerate<4 hours	Eurofins Biomnis
Aldosterone	EDTA x2 Spot Urine	EDTA x 2 Spin & Freeze < 4 hours URINE 1 Tube frozen < 4 hours	Eurofins Biomnis
Alkaline Phosphatase Isoenzymes	Serum Lithium Heparin	Alkaline Phosphatase processed in Biochemistry first. If abnormal alkaline phosphatase, refer to Eurofins Biomnis. Test includes Liver, Bone, Intestinal and Macromolecular Fractions. Unsuitable if Haemolysed - Discard	Eurofins Biomnis
Alpha 1 anti-trypsin	Serum	No special requirements.	Beaumont
Alpha 1 anti-trypsin phenotype	Serum	Beaumont will only test for Phenotype if A1AT is low- following the low result Beaumont forward the sample to Alpha 1 Foundation in the RCSI onsite.	RCSI Alpha 1 Foundation

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Aluminium level	Lithium Heparin	2ml Lithium Heparin -Sample separated < 1 hour. Biomnis send to sister Laboratory in France. Turnaround Time 10days	Eurofins Biomnis
Anti -Mullerian Hormone (AMH)	Serum	1ml Serum Must be sent on own Serum. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Amikacin Drug Levels	Serum	1 ml Serum Frozen < 4 hours No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Amino Acids	Lithium Heparin Serum Urine CSF	Clinical Details must be provided. Lithium Heparin: Spin and Freeze Urine: 5mls separate and freeze CSF must be paired with plasma and must be approved by Consultant Microbiologist. Urine 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	Temple Street Eurofins Biomnis
Aminophylline (Theophylline)	Serum		Beaumont (Drug)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Amnio PCR Amniocentesis	Amniotic Fluid		TDL
Amphetamine	Spot Urine	Part of drugs screen. Qualitative Test Only (Positive/Not Detected)	Eurofins Biomnis
Amyloid Antibodies (Protein Serum Amyloid A) (SAA)	Serum	Store at Room Temperature (Ambient)	Eurofins Biomnis
Androstenedione	Serum	1ml Serum No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Angiotensin Converting Enzyme (ACE)	Serum CSF	Serum: Spin & Separate <4 hours CSF: Spin, separate supernatant & freeze	St James Eurofins Biomnis
Antenatal Screen Booking Blood Serology	Serum	Includes: Hep B, Hep C, Tpha, HIV, Rubella and Varicella Zoster Virus	NVRL
Anti-Basement Membrane Antibodies (Glomerular)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Anti-Cyclic Citrulline Antibodies (CCP)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno) Eurofins Biomnis
Anti-Diuretic Hormone (ADH) Arginine Vasopressin Levels	24 Hr Urine Plain Aprotonin tube	24 Hour Urine plain collection Frozen (see Biomnis online Tests Guide) Aprotonin Tube: Spin and freeze <1hr Aprotonin tubes available in Referrals ONLY (short shelf life)	Eurofins Biomnis
Anti-Histone Antibodies	Serum	White Top Tube required. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont (Immuno)
Anti-Muscarinic antibodies (M3R) - Anti MUSK	Serum	1 ml Serum No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins
Anti-Nuclear Antibodies (ANA/ANF)	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. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Anti-Nuclear Cytoplasmic Antibodies (ANCA) (Anti Granulocytes Antibodies)	Serum	Includes Anti MPO and PR3 ANCA part of Vasculitis Screen not specific for Vasculitis, it is seen in other inflammatory disorders. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Anti-Phospholipid Antibodies (Cardiolipin & β2 Glycoprotein)	Serum	Includes cardiolipin antibodies and β2 Glycoprotein. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Anti-Platelet Antibodies	Serum		IBTS
Anti-Proteinase 3 PR3	Serum	Only performed if ANCA is positive. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Anti-Smooth Muscle Antibodies (ASMA)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Anti-Thrombin III	Sodium Citrate x 2	Spin and separate, freeze if not same day courier. Ensure platelet poor plasma	NCHCD St James Crumlin
Apolipoprotein A1 and B1	Serum	No special requirements.	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Aquaporin 4 (AQP4)	Serum	2ml Serum No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Arbovirus	Serum, or CSF	If delays >72 hours, spin and freeze Clinical Details and Travel Details essential. Yellow Fever Vaccine information required 2 screens available: US Panel - Contact NVRL Non-USA Panel Includes: Japanese Encephalitis, West Nile, Dengue, Yellow Fever, Venezuelan Equine Encephalitis	NVRL
Arsenic	Urine Hair Lithium Heparin	10ml Urine Hair to be sent ambient 3ml Lithium Heparin	Eurofins Biomnis
Anti-Streptolysin O Titres (ASOT)	Serum	Increased in Patients with Group A Strep Skin Infections. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont (Immuno)
Aspergillus antibodies	Serum	Spin and Refrigerated.	St James (Immuno)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Aspergillus Titres	Serum	No special requirements.	Beaumont (Immuno)
Astroviruses (Norovirus)	Stool 2-5g	No special requirements.	NVRL
Atypical Pneumonia Screen	Serum Urine Bronchial Lavage Nasopharngeal Aspirate	No special requirements	Eurofins Biomnis
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). This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Avian Antibodies Bird Fanciers Lung Antibodies	Serum		Beaumont (Immuno)
Barbiturates	Serum Urine	White Top Tube Qualitative Test Only (Pos or Neg)	Biomnis
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	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
BCR- ABL	Bone Marrow or EDTA Blood	EDTA: 9mls - see request form BMA: 9mls -see request form Breakpoint Cluster Region- Abelson gene This can be sent to CMD SJH please consult online manual before sending.	MLL
Bence Jones Protein Urine Protein Electrophoresis	24 hr Urine, or Spot Urine	Early morning urine sample is ideal. Ensure the total volume has been stated before aliquoting into Sarstedt Tube. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Benzodiazepine Benzamazapine (Benzo's)	Urine Serum (White Top)	Qualitative Test Only (Pos or Neg)	Eurofins Biomnis
β2 Glycoprotein	Serum	See Anti Phospholipid Antibodies This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
β2 Microglobulin	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
β2 Transferrin	Fluid (Oral/Nasal/Other) Serum	Fluid & Serum Must be sent together. Freeze < 4 hours for both Test requires a serum sample, to exclude any serum fraction of β-2-transferrin, and a body fluid sample, such as oral discharge, nasal discharge or other.	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
β D Glucan	Serum	SJH request form must be filled out	St James (Micro)
β HCG	Serum	1ml Serum Spin & Freeze < 4 hours Test requested on a male or as a tumour marker in female This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
β Hydroxybuturic Acid - Blood Ketones	EDTA CSF Urine	EDTA: Spin and freeze < 4 hours CSF: Freeze < 4 hours Urine 5ml Freeze<1 hour	Eurofins Biomnis
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 rc'd in Temple St. by 12 noon, send via taxi if the courier is missed. Cards available in Maternity 2 Ward	Temple St
Biotinidase	Serum	Spin & Freeze< 1 hour	Eurofins Biomnis
Bird Fanciers Lung Antibodies (Chlamydia Psittaci)	Serum	1 ml Serum	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
BK Virus (Polyomavirus)	Serum Urine	Spin, separate and freeze serum. Freeze urine.	NVRL
BRCA 1 and 2 gene	EDTA	Minimum 3.5ml EDTA. 10ml EDTA required for Full BRAC1+2 mutation screen	Beaumont
Bordetella Pertussis Antibody	Serum	Spin and refrigerate	Crumlin
Borrelia Burgdorferi (Lyme Disease)	CSF, or 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)	NVRL
Brucellosis Screen	Serum	False Positives if Yellow Fever Vaccine given recently and post Yersinia/Francisella Infection details must be included	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Bullous Pemphigoid Desmoglein Antibody (1 and 3) Skin Antibodies	Serum	If not sent out on same day, spin and store in fridge at 4oC. This can also be sent to Synnovis laboratory in London.	St James (Immuno)
C Peptide	Serum EDTA Lithium Heparin	Spin & Freeze < 4 hours. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
C Peptide Creatinine Ratio	24hr Urine Spot urine	Frozen < 4 hours. This can be sent to Eurofins Biomnis please consult online manual before sending.	Devon & Exeter
C1 Esterase Inhibitor (Complement C1 Inhibitor)	Serum	Spin and Freeze< 4 hours. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
C1q	Serum	Spin & Freeze< 24 hours Contact SJH to discuss before testing Batched 4-5 times a year CH100 performed and then C1q as required. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
C3 (Complement)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
C4 (Complement)	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
CH50- Total Haemolytic Completment	Serum	Serum spin and freeze < 1 hour	Eurofins Biomnis
Cadmium	Lithium Heparin Spot Urine	5ml Lithium Heparin	Biomnis
Caeruloplasmin	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Calcitonin	Serum	Spin & Freeze within 4hrs	Eurofins Biomnis
Calprotectin	Stool	Date must be on the request form.	Eurofins Biomnis
Cannabis	Spot Urine Plasma	Spin & Separate < 1 hour	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Carbamazepine Tegretol	Serum	White Top Tube required. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont (Bio)
Carbohydrate Deficient Transferrin CDT	Serum	No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Cardiolipin Antibodies (See Anti Phospholipid Antibodies)	Serum	See anti-phospholipid antibodies. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (immuno)
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**	Temple St (Metabolic)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Catecholamines	24 hour Urine Spot Urine Lithium Heparin Plasma x 2	Lithium Heparin: Spin & Freeze < 4 HOURS Paeds spot urine: Refrigerate in T28 4ml tube Urines are Refrigerate into T28 4ml bottle Includes: VMA, Noradrenaline, Adrenaline, Dopamine.	Eurofins Biomnis
Carbohydrate Deficient Glycoprotein Syndrome (CDG Screen) Transferrin Isoferase, or 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.	UCL, London, Neuroimmunology
CD4 Count (T Cell Lymphocyte)	EDTA	Must be tested within 24hrs Send FBC Report. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Haem)
CD34 count	Bone Marrow Aspirate in RPMI EDTA Cord blood	MUST contact SJH before referring. This can also be sent to MLL please consult online for request form and sample guidance.	St James (CMD)
CD38 (immunophenotyping)	Bone Marrow Aspirate in EDTA, or Blood EDTA	No special requirements. Send asap. This can also be sent to MLL please consult online for request form and sample guidance.	St James (CMD)
Cellcept 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. Specific request form to be used, available from Eurofins website	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Centromere Antibody (ACA)	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
CGH Array Microarray	EDTA	Samples are only viable for 5 days. Store at 4oC if delay in transport. Only send out Mon to Thurs	CeGaT
Chagas Disease (Trypansoma Cruzi) - Parasite Screen / Tape Worm, Hydatid Screen.	Serum	Faeces sample for a parasite screen in microbiology OLOL is the first line approach. Biomnis refer the serum samples to London	Eurofins Biomnis
Chikungunya	Serum	Spin & Freeze	NVRL
Chlamydia Trachomatis Serology (CT)	Serum	No special requirements. If patient is taking Biotin, stop treatment for 8days prior to testing	Eurofins Biomnis
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	NVRL
Chromium	Lithium Heparin Urine	5ml Lithium Heparin or 5ml EDTA Trace Metal Tube Do not use tubes with gel separation. Special request form available on Eurofins Biomnis website	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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.	MLL
Chromogranin A	Serum	Spin & Freeze< 4 hours	Eurofins Biomnis
Citric Acid Citrate	Serum 24 hr Urine (Plain)	Serum spin & Freeze < 4 hours Shake, aliquot and Freeze 5ml of Plain 24hr Collection. Part of Stone screen analysis.	Eurofins Biomnis
CJD (TSE)	CSF	• Clinical teams should contact the microbiology laboratory at least a day in advance (preferably longer) to notify them of the plan to send the CSF for testing for CJD so that they can liaise with the referrals department and plan for the specimen to be frozen and transported appropriately (dry ice is not kept in the lab so has to be ordered from an external company) • The following form needs to be completed prior to taking the CSF and brought to the laboratory with the CSF: https://www.cjd.ie/resources/INCJDSU%20Referral%20Form.pdf (also attached to this email) • CSF should be taken during routine working hours (ideally in the morning) to facilitate prompt processing and reduce the risk of errors • The CSF should be handed to the microbiology scientist with the form and the team member should tell the scientist that it is for CJD testing	Beaumont (Micro)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
CALR EXON 9	Bone Marrow Aspirate EDTA	9ml EDTA -Haematology request only. This can also be sent to CMD in SJH please ensure paperwork and sample type is correct. Check SJH user manual.	MLL
Clonorchiasis Chinese Liver fluke	Stool	Part of a Parasite Screen must be on Cherry Orchard request form	Cherry Orchard
Clozapine (Clozaril, Denzapine)	Lithium Heparin		Eurofins Biomnis
Clobazam Frisium Levels	Serum	White Top Tube. Spin & Freeze < 4 hours	Eurofins Biomnis
Cobalt	Lithium Heparin Urine	5ml Lithium Heparin 10ML Urine. See online manual for directions.	Biomnis
Cocaine	Spot Urine Blood in fluoride oxalate	Qualitative (Positive/Not Detected) Test Only Spin and separate blood within 1 hour.	Eurofins Biomnis
Collapsin Response Mediator Protein 2 CV2 Anti Neuron Antibodies	Serum	Refrigerate on arrival Multiple Sclerosis	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Complement Function (CH100 & AP100)	Serum	Spin and Freeze <4 hours	St James (Immuno)
Complement Lectin Mannose Binding	Serum	5ml Serum Spin and Freeze < 4 hours.	Beaumont (immuno)
Copper	Serum (white top) Lithium Heparin Urine	24 Hour Plain Urine: Decant 4mls of 24hr Plain urine sample into plain tube. State total volume on request form Lith/Hep sample spin and separate within 1 hour Serum spin and freeze within 4 hours	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Cortisol (Free Urine)	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.	Eurofins Biomnis
Coxiella Burnetti (Q Fever)	Serum	No special requirements	Eurofins Biomnis
Coxsackie A	Stool Swab	Contact NVRL before requesting test- Included under enterovirus in NVRL manual	NVRL
Coxsackie A & B	Serum CSF Swab Stool	No special requirements	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Cryoglobulin Screen	Serum	White/Brown accepted (White preferred) Everything must be kept at 37^{O}C: needles & tubes must be incubated prior to venepuncture, 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. Separate into Sarstedt Tubes. Once separated the serum can be transported at Room Temperature. Transcribe the 'Protocol Followed' on the form or the sample will be rejected. Haemolysed Samples are not valid. Phone SJH to inform them the Cryoglobulin screen is arriving. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Cryptococcal Neoforms	Serum Urine CSF	Antigen testing on CSF or Serum. Antibody testing on serum. No special requirements. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Micro)
CSF Viral Screen (CNS 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	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
CTD Screen Connective Tissue Screen	Serum	Only samples that have an equivocal or positive Connective Tissue Disease screen will have further testing to determine the individual antigens present. No special requirements. (See anti-nuclear antibodies) This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
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 (incl. Delta 508)	Crumlin (Genetics)
CTx collagen Type 1 Telopeptide	Serum	NOT for GP's- part of PINP screen This can be sent to Eurofins Biomnis please consult online manual before sending.	St Vincent's
Cyanide	EDTA Lithium Heparin	Refrigerate on arrival	Eurofins Biomnis
Cyclosporin A	EDTA	Trough level. Routinely performed Tuesday and Friday. Ring if required urgently. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis Crumlin (Haem)
Cystatin C	Serum	Refrigerate on arrival	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Cysteine	Urine	2x 3ml urine freeze<1 hour	Eurofins Biomnis
Cysticercosis	Serum	Must be on Cherry Orchard request form	Cherry Orchard
Cytomorphology	Bone Marrow EDTA 20ml peripheral blood		MLL
CMV CMV PCR Cytomeglovirus	Serum Urine EDTA	Urine: only for Paeds Serology: Serum, if >72hr delay, spin and freeze Only request SCMA if 'CMV only' requested EDTA: for PCR ONLY Spin & Freeze < 24 hours	NVRL
Cytotoxic antibodies (post and transplant ab's)	Serum	Serum 10 ml clotted Urgent Service Available if Required. Details of transplant status and clinical details essential. Non urgent requests delivery within 24 hours is ok. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont
Dehydroepiandrosterone DHEA	Serum	Not the same test as DHEAS. Review form to ensure if DHEA or DHEAS being requested.	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Dehydroepiandrosterone Sulfate DHEAS	Serum	1 ml Serum	St James (Bio)
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 This can be sent to Eurofins Biomnis please consult online manual before sending.	Crumlin (Genetics)
Type 1 Diabetic Screen	Serum	Serum samples x 2 required Test includes: Zinc Transporter ZnT8, Islet Antigen 2 Glutamic Acid Decarboxylase. This can be sent to Eurofins Biomnis please consult online manual before sending.	Devon & Exeter
Dengue Fever	Serum	If there is 72hr delay, spin and freeze serum. NB. Clinical Details and Travel information Essential Included in Arbovirus Panel.	NVRL
Dihydrotesterone DHT	Serum EDTA Lithium Heparin	To diagnose Idiopathic hirsutism and hirsutism. Will have normal Testosterone and decreased DHT. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Diptheria Titres Diptheria Antibodies	Serum	Refrigerate on arrival	Eurofins Biomnis
DNA Screen dsDNA	Serum	Can be performed on its own and as part of CTD screen. Batch tested weekly. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
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 This can be sent to Eurofins Biomnis please consult online manual before sending.	NCHCD St James
DPD (Dihydropyrimidine Dehydrogenase)	2xEDTA: pink 2.7ml	Consent form needed.	Biomnis
E.coli PCR	EDTA 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.	IMSRL Temple St
Epstein Barr Virus EBV PCR	EDTA (PCR) SERUM CSF	EDTA for PCR spin separate and freeze < 24hours	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Echincoccus	Stool Serum	Faeces sample for a parasite screen in Microbiology OLOL is the first line approach Serum 1 ml - Biomnis will refer samples to London	Cherry Orchard (Stool) Biomnis (Serum)
Elastase	Stool		BIOMNIS
ENA ELISA (Extractable Nuclear Antigens)	Serum Lithium Heparin	Reflex test of CTD. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Endomysial Antibodies	Serum	Reflex test only performed with a positive TTG. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Immuno)
Enterovirus	Stool Respiratory secretions CSF Blood Vesicular Fluid	A faecal sample is the specimen of choice.	NVRL
Epilepsy Disorder testing EDT	EDTA	CeGaT form must be filled out with patient signed consent and consultant signature.	CeGaT

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Erythropoietin EPO	Serum	Spin separate and freeze < 4 hours. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Haem)
Erythrocyte Protoporphyrin Porphyrins	EDTA	2x 3ml EDTA protected from light Appropriate clinical details, current medication and previous family history (if known) is required. If a delay is expected please measure and send the Hct (haematocrit) value, as this may be required by the Porphyrin laboratory. Refrigerate sample for up to 24 hours, but if greater delay is expected (over weekend), freeze sample, and send frozen ensuring the Hct is available. If an Acute Attack is suspected, please send a random urine sample immediately to the Porphyrin laboratory. During 9-5 Monday to Friday please contact the Porphyrin laboratory at 01-4162058 to inform staff of sample. Out of hours please contact the Biochemistry Department on-call staff member. This can be sent to Eurofins Biomnis please consult online manual before sending.	St James (Biochemical Genetics)
Ethosuximide Zarontin	Serum	White Top Spin & Freeze < 4 hours	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Ethylene Glycol	Serum	Spin separate and freeze < 4 Hours	Biomnis
Exome 1	EDTA	CeGaT request form must be filled out and patient consent signed	CeGaT
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, Factor X. **Urgent request to be agreed with Haematology Consultant**	St James (Coag) Crumlin (Haem)
Fabry Disease	EDTA Guthrie Card	EDTA Spin & Freeze < 4 hours Lyso GB3 EDTA Whole Spot Guthrie Card Alpha- Galactosidase A	Eurofins Biomnis
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	St James (Coag) Crumlin (Haem)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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	St James (Haem) Crumlin (Haem)
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	St James (Coag) Crumlin (Haem)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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	St James (Coag) Crumlin (Haem)
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	St James (Coag) Crumlin (Haem)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Factor VIII Inhibitor	Citrates	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	St James (Coag) Crumlin (Haem)
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	St James (Coag) Crumlin (Haem)
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	St James (Coag) Crumlin (Haem)

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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	St James (Coag) Crumlin (Haem)
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	St James (Coag) Crumlin (Haem)
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	St James (Coag)
Faecal Occult Blood FIT Test	STOOL	FIT KIT ONLY- Porter orders and issues FIT KITS	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Familial Hypercholesterolemia	EDTA	Familial Hypercholesterolemia request form must be filled out and genetic consent signed. Referred to: Biochemical Genetics Laboratory, Biochemistry Department, Central Pathology Laboratory, and St. James's Hospital. (01) 416 2054, biogeneticreports@stjames.ie. Consultant Chemical Pathologist: vcrowley@stjames.ie Specialist Registrar: (01) 416 2047 SHO: (01) 410 3875	St James (Biochemical genetics)
Farmers Lung Antibodies (Microspora faenii)	Serum		Beaumont
FISH (CLL)	Lithium Heparin Bone Marrow Aspirate	5-10ML of Bone Marrow Aspirate or peripheral blood with Heparin. Alternatively EDTA or Citrate can be used however BMA and Lithium Heparin sample of choice.	MLL
FISH (Multiple Myeloma)	Bone Marrow Aspirate Slides	3 unstained unfixed smears	MLL
Flecainide	Serum	White Top Serum Spin & Freeze < 4 hours	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Fluoxetine (Prozac)	Serum	White Serum Spin & Freeze < 4 hours	Biomnis
Flow Cytometry	Bone Marrow Aspirate EDTA	5-10ML of Bone Marrow or EDTA. Peripheral blood is only sufficient when malignant cells have entered the blood. If suspicion is that cells are only in the marrow, a BM is preferred sample. Sample should be sent Promptly. This can be sent to CMD SJH please consult online manual before sending.	MLL
Fragile X	EDTA	Medical history required. Crumlin request form must be filled out and genetic consent signed.	Crumlin (Genetics)
Francisella Screen (Tularaemia)	Serum	1ml Serum refrigerated on arrival	Biomnis
Fructosamine Glycosylated	Serum		Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Free Androgen Index FAI	SERUM		Biomnis
Free light chain assay	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
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.	Micro SJH
Gabapentin Neurontin	Serum	White Top Tube Spin & Freeze	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
GADA -Glutamic Acid Decarboxylase Antibodies	SERUM	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Galactomannan Aspergillus	Serum BAL - Broncho alveolar Lavage	St James request form must be filled out when requesting. This can be sent to Eurofins Biomnis please consult online manual before sending.	Micro SJH
Ganglioside antibodies	Serum CSF	1ml CSF or Serum	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Gastric Parietal Cells Parietal Cells	Serum	Test is run as part of The LKMA (liver & Kidney profile) and on its own. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Gastrin	Serum	1ml Serum Spin and Freeze <4 hour. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
G6PD (Glucose 6 Phosphate dehydrogenase)	EDTA	2 X 4 ML EDTA. 7 Day turnaround, contact Haematology for urgent samples turnaround time 48hours Send FBC report with request. This can be sent to Eurofins Biomnis please consult online manual before sending.	Haem SJH (A) Crumlin Haem
Genetic Tests (various)	Lithium Heparin EDTA	Sample type dependent on requested Genetic test consult Crumlin Genetics for sample type	Crumlin (Genetics)
Glomerular Basement Membrane Antibodies Anti GBM	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Glucagon	EDTA Plasma & Aprotinine	Spin & Freeze<4 hours	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Group B Streptococcus (PCR)	CSF 0.5ml EDTA	CSF: Only if aged <90days EDTA: <7days	IMSRL Temple St
Growth Hormone GH Pituitary Function Screen	Serum	1ml Serum Spin & Freeze < 4 hours	Eurofins Biomnis
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	Biomnis
Haemoglobin Electrophoresis (HPLC) (<16 years old) Haemoglobin Electrophoresis (HPLC)	EDTA	Serum sample is required if Ferritin result not available Please attach an FBC Report. Include Ferritin result if available.	Haem SJH Haem Crumlin

Tests	Sample Type & Volume	Special Requirements	Referral Lab
(>16 years) inclds Thalassaemia Screen			
Haemophilus Influenza B Antibodies HIB Titres	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Haemophilus Influenza PCR	CSF EDTA	Type B result.	IMSRL Temple St
Haptoglobins	Serum	Patients > 1 year 4ml EDTA or 5ml Serum Infants <1 year send White top serum to biochemistry Crumlin	Biomnis
HE4 (Human Epididymis Protein 4)	Serum	Spin & Freeze <4 hours Run in conjunction with CA125- ovarian and endometrial cancer Confirm with the Requesting Consultant whether the test is essential	Biomnis
Helicobacter Pylori Abs	Serum		Biomnis
Helicobacter Pylori (H. Pylori)	Stool	Stool sample is frozen	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Helicobacter Pylori-Culture	Antral/fundal biopsies	This test must be pre-arranged with laboratory as media needs to be ordered. Must be tested no later than 48 hours after the collection of biopsies in the case of refrigerated shipments. If the delay is > 48 hours, the sample must be frozen at the correspondent and then sent FROZEN. Indicate the dates of freezing of the sample.	Eurofins Biomnis
HIT- Heparin Induced Thrombocytopenia	Serum	If the delay is > 48 hours, the sample must be frozen at the correspondent and then sent FROZEN. Indicate the dates of freezing of the sample. This can be sent to Eurofins Biomnis please consult online manual before sending.	Haem SJH
Hepatitis A IgG Titres	Serum	Only send if titres are specifically requested - indication of immunity	NVRL
Hepatitis A IgM	Serum	Ensure Hepatitis E code is also requested (HEFM)	NVRL
Hepatitis B Surface Antigen (Hep B sAg)	Serum		NVRL
Hepatitis B Core Antibodies (Anti-HB c Ab)	Serum		NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Hepatitis B Surface Antibodies (Anti-HBs) (Hep B Titres)	Serum		NVRL
Hepatitis B Viral Load Hepatitis B Genotypes Hepatitis B PCR	EDTA	Spin & Freeze< 24 hours	NVRL
Hepatitis C Virus Hep C Hep C Ag	Serum		NVRL
Hepatitis C Antibody Anti-Hep C Anti H cab	Serum		NVRL
Hepatitis C Viral Load Hepatitis C Genotypes Hepatitis C PCR	EDTA	Spin & Freeze<24 hours	NVRL
Hepatitis D Delta Virus	Serum	Infection only occurs if patient has Hepatitis B	NVRL
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	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Herpes Simplex Virus HSV 1+2	CSF Serum Viral Swab Urine EDTA for PCR only	EDTA - Spin & Freeze < 24 hours	NVRL
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.	NVRL
HIV Human Immunodeficiency Virus HIV Viral Load HIV PCR	Serum EDTA (PCR)	EDTA for PCR: Spin & Freeze	NVRL
HLA B27, DR4, B44, DRB1 0407	EDTA Citrate	5- 10 ml EDTA or Citrate - keep at room temperature.	IBTS

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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	IBTS
Homocysteine	EDTA	EDTA Spin & freeze <15 MINS Lithium Heparin Paeds only <15mins Sufficient Clinical details must be provided.	Biomnis (Adult) Haem Crumlin (Paed)
Homovanillic Acid HVA	24hr Urine (Adult) Spot Urine (Paeds)	24 Hour Urine: 1 Aliquot in urine tube Freeze <4 hours Spot Urine: 2 Aliquot in urine tubes Freeze< 4 hours	Biomnis
Huma T-LymphotropiC Virus HTLV 1& 2	Serum		NVRL
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*	Bio Temple St
IgE Specific RAST	Serum	Allergens are referred to Beaumont. Any allergens that are not tested for in Beaumont are referred to Eurofins Biomnis.	Beaumont Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
IgG Sub-Classes (1-4) IgGS	Serum	IgG1, 2&3 processed. IgG 4 is only processed on special request (autoimmune pancreatitis) This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Infliximab Levels and Antibody Remsima Anti-Remicade® antibodies anti-Infliximab antibodies Inflectra Ustekinumab	Serum	Ensure that the sample is referred at Room Temperature (RT) If level is <1ug.ml then antibody level will be performed Details Required includes: infusion dosing, number of doses and reason for request. This can be sent to Eurofins Biomnis please consult online manual before sending.	Devon & Exeter
Influenza (A and B)	Viral Swab	Influenzae Screen includes: Influenzae A (H1/H3 subtype analysis) Influenzae B RT-PCR Swine flu influenzae A/H1 Parainfluenzae 1,2, 3 + 4 Human Metapneumovirus RSVAdenovirus	NVRL
Inhibin A and B	Serum	Spin & Freeze <4 hours	Biomnis
Insulin Antibodies	Serum	Spin & Freeze <4 hours	Biomnis
Insulin Insulin Level	Serum	1ml Serum Spin & Freeze < 4 hours	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Insulin Like Growth Factor IGF-1 IGFR	Serum	1ml Serum Spin & Freeze <4 hours	Eurofins Biomnis
Insulin Like Growth Factor 2 IGF-11 IGFR-11	Serum	Spin & Freeze <4 hours	Biomnis
Insulin Like Growth Binding Protein 3 IGF-BP3	Serum	Spin & Freeze <4 hours	Biomnis
Interleukin 2 Receptor IL2	EDTA	Spin and Freeze <4 hours	Biomnis
Intrinsic Factor Antibodies	Serum	Spin & Freeze <24 hours. B12 must be performed This can be sent to Eurofins Biomnis please consult online manual before sending.	Haem SJH
Intrinsic Factor Screen	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	Haem SJH(Adults) Crumlin Hae(PAEDS)
Iodine	Serum	Refrigerate on arrival	Biomnis
Islet Cell Antibodies	Serum	Islet Cell Antibodies are also part of the Type 1 Diabetes Screen- See Code T1DS	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Isoniazid Level	Serum	Spin & Freeze <1hour Anti TB Drug, take the sample 3 hrs post dose Clinical Information required inclds: patient height, weight	Biomnis
Itraconazole Level	Serum	Spin & Freeze < 4 hours	Biomnis
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) This can be sent to CMD SJH please consult online manual before sending.	MLL
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)	Crumlin (Genetics)
Karyotyping (>5 years old)	Lithium Heparin x 2		TDL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Keppra Levetiracetam	Serum	White Top Tube Spin & Freeze Clinical Details of dose essential	Biomnis
Kidney Stones Liver Stones Bladder Stones	Stone	Use a dry Universal Container Refer to the referral unit in the Mater Hospital. This can be sent to Eurofins Biomnis please consult online manual before sending.	Mater Misericodiae University Hospital
Lacosamide	Serum	Spin & Freeze<4 hours	Biomnis
Lactate	CSF	Freeze < 1 hour. Do not freeze in glass tubes	Biomnis
Lactose Intolerance Reducing Substance	Serum Stool	Not Available for GP's Advise Stool for Reducing Substances Serum sent to Sheffield	Biomnis
Lamictal Levels Lamotrigine Levels	Serum	White Top Tube Spin & Freeze 4 hours	Biomnis
Lead	EDTA Spot Urine 24 hour Urine	Spot Urine should be from end of working day	Biomnis
Leishmania Complement Fixation Test	Serum EDTA	Parasite reference Laboratory	Parasitology Ref Laboratory for Tropical Disease London

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Leptospirosis Weil's Disease	Serum	If positive or clinically indicative then NVRL refer to Leptospira Reference Unit, Herford, UK	NVRL
Lexapro Escitalopram Citalopram	Serum	Serum White Top Spin & Freeze < 4 hours Include Dosage, Commencement Date, Reason for Test (Toxicity, Efficiency).	Biomnis
Lipase	Serum Urine	Serum: 1ml Urine: 24 hr plain Urine or Spot Urine	Biomnis
Lipoprotein A LpA	Serum	NOT to be confused with LPA1	Biomnis
Listeria Monocytogenes PCR	CSF	CSF Child: If child is > 90days old it must include clinical indication for testing. This can be sent to Eurofins Biomnis please consult online manual before sending.	IMSRL Temple St
Liver/Kidney Microsomal Antibodies LKMA Antibodies	Serum	This screen includes the following tests: Liver/Kidney Micro Mitochondrial Abs Parietal Cell Abs Smooth Muscle abs. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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. This can be sent to Eurofins Biomnis please consult online manual before sending.	Haem SJH Haem Crumlin
Lyme Disease (See Borrelia Burgdorferi)	Serum	Spin and freeze if >72 hour delay	NVRL
Lymphocyte Subset T&B Cells	EDTA	**Paediatrics:** MUST be tested within 12 hours. Send via taxi to Crumlin if the courier is missed. Always Incld most recent FBC Report **Adults:** Must be tested within 72 hours. Always send FBC report. Store samples at room temperature.	Haem SJH Haem Crumlin
Macroprolactin	Serum	Prolactin Reflex Test Write 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	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Magnesium	24hr Acidified Urine	Cannot be done on a spot urine sample. PH of 1 required.	Biomnis
Malaria Confirmation	EDTA Blood Film	1X EDTA & 2 Unstained slides. Only sent at request of Haematology Scientist.	London School of Tropical Medicine
Manganese	Serum Lithium Heparin Spot Urine	Urine sample ideally should be from end of working shift.	Biomnis
Measles	Serum Salvia		NVRL
Meningococcal PCR	EDTA CSF	Must reach IMSL Temple St before 11am. 1 test Run per day. Positive results are phoned to requesting clinician Monday- Friday from 4.30pm	IMSRL Temple St
Mercury	Lithium Heparin EDTA trace metal Urine	5ml Lithium Heparin or EDTA Trace Metal Tube	Eurofins Biomnis
Metanephrines	EDTA 24 hr Urine Spot Urine (paeds only)	EDTA: Spin & Freeze <1 hour **Adult:** 24 hr Urine Freeze <4hours once collection has finished **Paeds:** Spot Urine freeze < 4 hours after collection	UHSM Biomnis
Methadone	Spot Urine	Qualitative Test (Positive/Not Detected)	BIOMNIS
Methanol	Serum Urine	Serum Spin & Freeze <4 hours Urine Refrigerated	Biomnis
Methotrexate	Serum	1ml Serum (DO NOT use tubes with Separator gel)	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Methylmalonic acid	Lithium Heparin Urine	Lithium Heparin: Spin & Freeze <1 hour Urine: 15ml Freeze < 4 hours Screen for Low Vitamin B12	Biomnis
Micro Array	EDTA	EDTA 2-5ml preferred sample for testing. Alternatively (only if blood cannot be obtained) Saliva/Buccal Swab, Amniotic Fluid or Dried blood Spots. Confirm with CeGaT before sending Alternative samples. **NB: Medical History required and genetic consent on CeGaT form.**	CeGaT
Mixing studies 50:50	citrate		Crumlin
Molecular Gastroenteritis Screen Winter Vomiting Bug	Faeces Rectal Swab	Tests include: Norovirus, Rotavirus, Rotavirus vacc. Strain, Adenovirus, Astrovirus, Sapovirus	NVRL
Mitochondrial Antibodies	Serum	Also part of the LKMA. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
M Pox	Viral swab taken from a cutaneous lesion either ulcer or vesicular fluid if present	Inform Consultant Microbiologist. Inform Public Health and NVRL to alert of probable sample for MPX investigation. Double bag sample at point of collection in clinical setting. Transport to the NVRL as Category A Pathogen.	NVRL
MPL Mutation	EDTA	This can be sent to CMD SJH please consult online manual before sending.	MLL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Mucopolsaccharide MPS GAG Arylsulphase C	Urine	Freeze sample straight away Urine: 5-10 ml This can be sent to Eurofins Biomnis please consult online manual before sending.	Willink
Mumps Paramyxovirus	Serum Saliva Buccal Swabs	Only order IgG if titres are requested	NVRL
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	IMRL SJH
Mycoplasma genitalium	Anogenital swabs Urine	Aptima kit required	NVRL
Mycoplasma Pneumoniae	Serum Throat Swab	This can be sent to Eurofins Biomnis please consult online manual before sending.	NVRL
Myelin Associated Glycoprotein Antibodies (MAG)	Serum	1ml Serum	Eurofins Biomnis
Myelin Oligodendrocyte Glycoprotein (MOG)	Serum CSF		Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
MPO Myeloperoxidase Antibodies	Serum	Performed as a reflex test when ANCA is positive. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Myeloma Screen SPEP Serum Protein Electrophoresis	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
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. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Myoglobin	Serum Urine	Serum: Spin & Freeze< 4 hours Urine : Freeze 24hr Plain Collection or Spot Urine FROZEN < 4 Hours after collection	Biomnis
Natural Killer Cells (NK) Lymphocyte Immunophenotyping CD16 CD56	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	MLL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Neonatal Alloimmune 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**	Bristol
Neuron Specific Enolase NSE	Serum	Spin & Freeze< 4 hours Confirm request with requesting clinical team	Biomnis
Neuronal Antibodies Paraneoplastic Antibodies	Serum CSF	Test includes: Hu, Yo, R1, CV2, CRMP5 Ma 1 and 2, Amphiplysin.	Beaumont
Neurontin (Gabapentin)	Serum	White Serum Spin & Freeze < 4 hours	Biomnis
NOTCH 3	EDTA	Minimum 1-2mls Correct CeGaT form with Clinical Details and patient consent must be filled out	CeGaT
NT-pro-BNP	Serum	Heart failure Marker	Biomnis
Neutrophil cytoplasmic antibodies	Serum	ANCA is part of the vasculitic Screen. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Non Invasive Prenatal Testing	EDTA		Evie Clinic
Norovirus	Stool		NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Occupational Health Screen	Serum	Includes Anti HBs (Hep B titres), Anti VZV (IgG) ,Measles IgG, Mumps IgG, Rubella IgG	NVRL
Oligoconal Bands Isoelective focussing	SERUM& CSF	Both Samples must go together. Serum sample should be taken within 12 hours before or after CSF extracted. This can be sent to Immunology St James please consult online manual before sending.	Biomnis
Organic Acids	Spot Urine	Freeze < 15MINS Clinical Details essential & PH level on FORM. All developmental/ Learning difficulty Must be stated on request form.	Metabolic Temple St Eurofins Biomnis
Osmotic Fragility Membrane Screen (EMA)	EDTA	FBC & Blood film required. Send FBC report and film- Needed within 24 hours of Phlebotomy, Please phone St James Hospital before sending test.	Haem SJH
Anti-Neuromyelitis Optica Antibodies (NMO)	Serum	1ml Serum refrigerated on arrival	Eurofins Biomnis
Oxidative Burst Neutrophil Function Test Neutroblasts	EDTA	Sample: EDTA -Ambient must be tested within 4 hours. A TRAVEL CONTROL must be sent with each sample. Send URGENTLY by Taxi. MUST be PRE-ARRANGED with Haematology Dept in both Crumlin & SJH. Must arrive before 10.30am in Crumlin and 13:00pm in SJH. Used in Diagnosis of CGD.	Haem SJH (Adult) Haem Crumlin (Paed)
Oxalate Oxalic Acid	24hr Acidified Urine	Urine: 24 hr Acidified urine. Please ensure record of the total volume is on request form before referring.	UCLH London

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Oxcarbazepine Trileptal Zebinx Eslicarbazepine	Serum	Spin & Freeze < 4 hours	Biomnis
Pancreatic Polypeptide	1ml Serum	White Top Tube Spin & Freeze < 4 hours	Biomnis
PNH Paroxysmal Nocturnal Haemoglobinuria	EDTA	**Adults:** 4ml EDTA- Must be tested within 48 hours of venepuncture. **Paeds**: 1.2ml EDTA samples must arrive before 10am on Friday and within 48hours of venepuncture	Haem SJH (Adult) Haem Crumlin (Paed)
Parasite Screen Ova and Parasite	Faeces Serum	Parasite Stool Screen inclds: Toxocara, Schistomas, Trichnella Echincoccus, Wucheria Cysticercosis	Cherry Orchard
Parathyroid Hormone PTH	Serum	1ml Serum Spin & Freeze< 4 hours	Eurofins Biomnis
Parathyroid Related Peptide PTH-rp	Aprotinin tube	Spin & Freeze < 1 Hour Aprotonin tubes are available from the Referral Dept Authorization required from Endocrinologist directly, contactable via switch	Biomnis
Parietal Cell Antibodies	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Parvovirus Antibodies (B19/Slapped Cheek)	Serum Saliva		NVRL
Parvovirus PCR	EDTA		NVRL
Pertussis	Swab	Blue top wired swab	Micro Crumlin
PFA-100 Platelet Function Analysis	Citrate	Same day referral, has to arrive in SJH before 2pm. DO NOT SEPARATE OR SPIN	Coag SJH
Phenobarbital Phenobarbitone	Serum	White Top Tube. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont
Phenylalanine	Lithium Heparin Dried blood spot card	Lithium Heparin 0.5-1.2ml -Separate sample prior to dispatch per Crumlin online guidelines Dried blood spot card- 2 full circles required on card. Air-dry for 2 hours. Avoid heat and Humidity **Clinical details are essential** No Weekend service available This can be sent to Eurofins Biomnis please consult online manual before sending.	15C
Phenytoin Epanutin	Serum		Biomnis
Phosphatidylethanol PHOET PETH	EDTA	5ml EDTA	Biomnis
Phosphate	Urine		Temple St

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Phospholipid Antibodies	Serum	Test includes B2 Glycoprotein and Cardiolipin antibodies. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
PINP - Procollagen 1 Intact N Terminal P1NP	Serum	Baseline before commencement of therapy and subsequently 3 and 6 months post therapy. Bone Turnover Marker This can be sent to Eurofins Biomnis please consult online manual before sending.	St Vincent's
PLA2R Antibodies	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Sheffield
Plasma Viscosity	EDTA	2 x 4ml EDTA stored at room temperature can be analysed for up to 4 days.	Haem SJH
Platelet Immunophenotyping	Citrate	Must be in referral < 8 hours post phlebotomy. Phone Haematology Laboratory in advance	Haem SJH
Pneumocystis Jiroveci PJP PCP	BAL Sputum	600ul of sample required.	NVRL
Pneumococcal Antibodies	Serum	IgG Titres.	Immuno SJH
Pneumococcal PCR Strep. Pneumoniae S. pneumoniae	EDTA CSF Pleural Fluid Joint Fluid	Sample must be received before 11am for same day result	IMSRL Temple St

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Polio Antibodies PV1 PSV1 Poliovirus type 1 Poliomyelitis	Serum	Type 1,2 and 3 performed	Biomnis
Porphyrin Screen	EDTA Lithium heparin Faeces Urine Spot/24hr plain	ALL SAMPLES MUST BE PROTECTED FROM LIGHT See St James Laboratory User manual for request form. In case of suspected acute porphyria attack a random urine sample is required to rule out an acute attack. Other samples are required to complete the porphyria work-up.	Biochemistry SJH
Post Mortem Toxicology	Blood Urine		State Lab
Post Transfusion Purpura PTP	EDTA (standard) SERUM (Antibody)	EDTA is standard sample. Serum required if you wish to obtain antibody testing. Must be accompanied by NHSBT form ensure box is ticked for consent. Test processed in the H&I Laboratory. The receiving laboratory address is NHSBT North Bristol Park, Northway, Filton, Bristol, BS34 7QH.	Bristol
Pre-Albumin TTR Transthyretin	Serum	ALWAYS specify patient Age & Gender	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Prader Willi Syndrome	EDTA	2 x 2ml EDTA - Must be on Crumlin Genetic request form and have signed consent	Crumlin (Genetics)
Pro BNP	Serum		Biomnis
Pro Collagen III N-Terminal propeptide of type III procollagen	Serum	Spin & Freeze < 4 hours	Biomnis
Products of Conception Cytogenetics Testing	Tissue -POC	Sample 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	GOSH
Proinsulin	Serum	Spin & Freeze < 4 hours	Biomnis
Propoxyphene	Spot Urine	Qualitative Test (Positive/Not Detected)	Biomnis
Proteinase 3 ANCA (Proteinase 3 – Anti-neutrophil cytoplasmic antibodies)	Serum	This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Prothrombin Gene Mutation Analysis	EDTA	Store at 4oC - Refer to St James Laboratory user Manual for Thrombophilia Mutation Analysis Consent form and testing guidelines.	Coag SJH

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Pyruvate Kinase	EDTA	2-5ml whole blood not clotted or frozen. Must reach lab within 48 hrs. (Mon -Weds only)	Haematology Cell Protein Lab Kings College
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 10 times 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 Fill in Biomnis Incubation Details on Quantiferon Forms available in Referrals	Eurofins Biomnis
Red Cell Folate	EDTA	4-6ml EDTA	TDL
Reducing Substances Reducing Sugars	Stool Urine spot	Urine Add HCL to give pH of <2 0.5 mls for every 10ml of urine	Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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 and to where should be recorded in notepad in WinPath.	
Renin Activity	EDTA	1ml Spin & Freeze<4 hour. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Risperidone	Lithium Heparin	2ml Lithium Heparin	Eurofins Biomnis
Ritalin Methylphenidate Hydrochloride	Serum	White Top Tube Spin & Freeze <4 hours	Eurofins Biomnis
Rotavirus	Stool Rectal Swab	See Winter Vomiting Bug (Molecular Gastroenteritis Screen)	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Rubella Antibodies	Serum	Current Rubella infection is IgM. The vast majority of requests are IgG	NVRL
Sacromeric Antibodies	Serum CSF		Oxford
Selenium	URINE Lithium Heparin	2 ml Lithium Heparin Refrigerate or 20 ml Spot Urine refrigerate	Eurofins Biomnis
Seroquel Level Quetiapine Xeroquel	Lithium Heparin	3ml Lithium Heparin- Refrigerate	Eurofins Biomnis
Sertraline level	serum	White Top Tube Spin & Freeze <4 hours	Eurofins Biomnis
Serum Free Light Chains SFLC	Serum	Test not available for GP's. This can be sent to Eurofins Biomnis please consult online manual before sending.	Immuno SJH
Sex Hormone Binding Globulin SHBG	Serum	1ml Serum	Eurofins Biomnis
Somatostatin	Aprotinin tube	Spin, separate & Freeze < 1 hour Sample to be delivered on Ice and centrifuged straight away.	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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 ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Eurofins Biomnis
Steroid Profile Urine	Spot Urine 24 Hour Plain Urine	Spot Urine: Freeze immediately 20mls 24 Hour Urine: Plain Collection- Freeze 20mls immediately and state total volume on request form.	Steroid Profile- Kings College
Strychnine	Urine		Eurofins Biomnis
Sulphonylureas	Serum 24 hour Plain Urine Spot Urine	Serum: Spin & Freeze < 4 hours Urine: 24 Hour urine collection or Spot urine freeze	Eurofins Biomnis
Syphillis Treponema Pallidum TPHA	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	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Tau Protein	CSF EDTA Lithium Heparin	CSF sent directly to Microbiology. Please ensure request forms x 2 are filled out properly.	Eurofins Biomnis
T Cell receptor rearrangement	Bone Marrow in RPMI EDTA	Requires Haematology Consultant Approval Includes: T 11:14 PCR	CMD SJH
Tacrolimus Prograf, FK 506	EDTA	This can be sent to Eurofins Biomnis please consult online manual before sending.	Haem SJH Bio Crumlin
Testosterone	Serum	1ml Serum	Eurofins Biomnis
Tetanus Antibodies Tetanus IgG	Serum	Clinical Details Essential	Immuno SJH
Theophylline (Uniphylline)	Serum	White Top Tube Newborn interpretation difficult due to theophylline converting to Xanthine	Beaumont
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 This can be sent to Eurofins Biomnis please consult online manual before sending.	Birmingham

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Thrombophilia Screen	Sodium Citrate EDTA	**Adults**: 6 x 3ml Coag & 1 x 4ml EDTA. St James Thrombophillia Request form must be filled out **Paeds:** 2x 3ml Coags	13C Adult 21A Paeds
Thyroglobulin Antibodies TG	Serum	1ml Serum	Eurofins Biomnis
Thyroid Receptor Antibodies TRAB Long Acting Thyroid Stimulating Test LATS	Serum	1ml Serum	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Tobramycin	Serum	White Top Tube Spin & Freeze < 24 hours This can be sent to Eurofins Biomnis please consult online manual before sending.	Mater Misericodiae University Hospital
Topiramate Topamax	Serum	Spin & Freeze <4 hours	Eurofins Biomnis
Torch Screen	Serum Swab (HSV Only)	Serum: for Toxoplasma, Rubella & CMV. Swab: for HSV. All sent together for TORCH screen	NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
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	NVRL
Transferrin Receptor sTfR	Serum	Spin & Freeze <24 hours.	Haem SJH
Tramadol Levels	serum	White Top Tube Spin & Freeze<4 hours Drug Doze must be included in Clinical Details	Eurofins Biomnis
Trichomonas vaginalis	Urine Swab	Aptima Kit	NVRL
Trimethylaminuria TMA "Fish odor Syndrome"	Spot Urine 24hr Acidified Urine		TDL
Tryptase	Serum		Beaumont

Tests	Sample Type & Volume	Special Requirements	Referral Lab
TTG Tissue Transglutaminase Antibodies Anti Gliadin Antibodies Coeliac Screen	Serum	The person must be eating gluten regularly before the test; otherwise, results can be falsely negative. This can be sent to Eurofins Biomnis please consult online manual before sending.	Beaumont
TP53- Tumour Protein 53	EDTA	This can be sent to Eurofins Biomnis please consult online manual before sending.	Belfast
Tpe 1 Diabetes Screen T1DS	Serum	Test includes: Gad antibodies (GAD65), IA-2 antibodies Islet antigen 2 antibodies and ZnT8 antibodies	Devon & Exeter
Uric Acid	24hr Plain Urine	Aliquot into T28 4ml tube	Eurofins Biomnis
Urine Stone Screen	24 hour Plain Urine		UHNM-University of North Midlands NHS Trust

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Vanillymandelic Acid VMA	24hr Acidified Urine Spot Urine	Adult 1 aliquot in tube of urine Paeds: 2 Aliquots urine frozen < 4 hours. **Guidelines** specify the diuresis (volume of urine of 24H). Child (<18 years): The determination of urinary creatinine and homovanillic acid (HVA) are carried out systematically. Freeze quickly after the end of the collection. The determination of urinary creatinine is carried out systematically. Urines have to be stored refrigerated during the collection process No need of specific diet anymore. Do not transmit pot Adult: mandatory diuresis	Eurofins Biomnis
Varicella Zoster Virus (VZV) (Chicken Pox)	Serum Swab		NVRL
Vascular Endothelial Growth Factor Cytokine VEGF	Serum	EDTA Spin & Freeze < 4 hours	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Vasculitic 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. This can be sent to Eurofins Biomnis please consult online manual before sending. (tests run separately rather than part of a screen)	Immuno SJH
Vasoactive Intestinal Peptide VIP	Aprotinin tube	Spin & Freeze <1 hour Please note the Aprotonin tubes are available at referrals Laboratory	Eurofins Biomnis
Very Long Chain Fatty Acids VLCFA	EDTA Lithium Heparin	Frozen < 4 hour. This test can include: Peroxisomal Studies, Phytanic Acid and Pristanic Acid Laboratory requests that sample must reach laboratory within 72 hours. Test Monday- Wednesday only.	Willink

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Viral Respiratory Culture/Screen	Bronchial Lavage (min 1ml) Gastric Washings Serum Respiratory Fluids Throat, Nasopharngeal Swab, Sputum, Tracheal Aspirates Urine Lymph Node Blood	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 Pneumoniar, Mycoplasma Pneumoniae	NVRL
Vitamin A	Heparin	Sample to be frozen within 90 minutes. If requested with vitamin E, 1 specific aliquot for both assays. **Store samples protected from light but do not pack the tube**	Eurofins Biomnis
Vitamin B1 Thiamine	EDTA	Freeze whole<4 hours. This can be sent to Eurofins Biomnis please consult online manual before sending.	Eurofins Biomnis
Vitamin B6	EDTA	Ensure sample is Protected from light, wrap in foil when taking sample. Freeze sample WHOLE DO NOT SPIN.	Eurofins Biomnis
Vitamin C Ascorbic	Serum	Freeze < 1 hour Protect from light by wrapping in foil	Eurofins Biomnis

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Vitamin E Alpha Toco Pherol	Serum	Sample to be frozen within 90 minutes. If requested with vitamin A, 1 specific aliquot for both assays. **Store samples protected from light but do not pack the tube**	Eurofins Biomnis
Vitamin K Phylloquinone	Serum	If requested with vitamin A, 1 specific aliquot for both assays.	Eurofins Biomnis
Voltage Gated Calcium Channel Complex VGCC	Serum		Oxford
Voltage Gated Potassium Channel Complex VGKC	Serum	If result positive/equivocal tests reflexed are LGI1 and CASPR2 (Test is no longer run on CSF) This can be sent to Eurofins Biomnis please consult online manual before sending.	Oxford

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Von Willebrand Screen	Sodium Citrate	Adults: Citrates x 6 Paediatrics Citrates x 4 Samples must be received within 4 hours of venesection or spin & freeze by Haematology. Test includes: Factor VIII:C, VWF Antigen, Glycoprotein 1b, VWF Collagen Binding, VWF Multimer Analysis, VWF:VIIIB Assay	Haem SJH (Adults) Haem Crumlin (Paeds)
Voriconazole Levels	Serum	3 mL : Serum (do not use tubes with separator gel) - FROZEN Spin & Freeze < 4 hours	Eurofins Biomnis
Weil's Disease Leptospirosis	Serum		NVRL
Whipples Disease	EDTA Serum Saliva Stool Biopsy Stool CSF		Eurofins Biomnis
Winter Vomiting Bug	Stool Rectal Swab		NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
White Cell Enzymes Lysosomal enzymes	EDTA	Minimum 5ml EDTA **Please contact Laboratory before taking sample, Test is time sensitive for transport. Only take Monday- Wednesday.** Sample must reach laboratory within 48 hours. 15 enzymes investigated in screen. If samples received are < 5 ml EDTA Willink will only do enzymes relevant to clinical details.	Willink
White Cell Enzymes for Mucopolysaccharides	EDTA	Minimum 5 ml EDTA Send by Courier same day Please contact Laboratory before taking sample, Test is time sensitive for transport. Only take Monday-Wednesday.	Willink
Xanthochromia	CSF (min 1ml) (CSF ample 3 or 4ml)	Sample must be delivered directly to Microbiology. 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	Synnovis
Zika virus	Serum Urine CSF on request		NVRL

Tests	Sample Type & Volume	Special Requirements	Referral Lab
Zinc	Plasma Serum	Not Available For GP's.	Eurofins Biomnis
Zn T8 Antibody	Serum	Serum Familial diabetes trait. Part of T1DS This can be sent to Eurofins Biomnis please consult online manual before sending.	Devon & Exeter