Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

CUH
Ospidéal Ollscoile Chorcaí
Cork University Hospital

CORK UNIVERSITY HOSPITAL
LABORATORY MEDICINE USER HANDBOOK

Test Directory (A-Z) Quick Link (press Ctrl and Select letter)

Reference No:	PPG-CUH-PAT-31	**Revision No:** 23 **Review Cycle:**	1 year
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Approver(s):	Dr Vitaliy Mykytiv, Ms Sinead Creagh	**Approval Date:**	29/07/2024 23/07/2024

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1 AMENDMENT TABLE

The Laboratory Medicine User Handbook is controlled in accordance with local quality management system requirements. Amendments to the last revision are listed in the table below. The full amendment history is available by contacting the Laboratory Medicine Quality Manager (refer to section 4.3: Contact Details).

Amended Section(s)	Amendment
Section 2 Introducton	New sections: 2.4 Impartiality policy 2.5 Confidentiality policy 2.6 Release of information 2.7 Service users 2.8 Service agreements
Section 3.3 Contact Details	Pathology: Added new consultant pathologists
	Haematology: Added new consultant Haematologist
Section 3.4 Advisory services	New section
Section 3.7 Sample transportation	Blood cultures must be delivered within 4 hours of collection.
Section 4.6 Clinical services	Details added re addition of RSV, POCT Glucose, POCT Ketone
Section 4.3 and 7.5	Removed requirement to transport/store samples for GC at room temperature.
Section 5 Patient collected samples	Section 5.2 Mid Stream Urine (MSU) Collection Updated instructions for new vacutainer devices for MSU
Section 6.1 Requirements for Patient Consent	• Pathology: a completed patient consent form the disposal of an amputated limb FOR-CUH-PAT-1108 must accompany amputated limb specimens. • Haematology: FOR-CUH-PAT-1575 Thrombophilia screen/ Antiphospholipid antibody screen Request Form, the patient consent sections must be completed in full, if further molecular testing is required for Factor V Leiden and Prothrombin Gene (G20210A) mutations. • Biochemistry: LF-C-BIO-HHRF Moecular Genetic Request for Hereditary Haemachromatosis, CHI-DCG Request for Genetic Analysis must accompany CeGaT and all NHS Genomic Test Request Forms - patient consent section must be complete and the form must include patient and clinician sigatures
Section 6.6 Time limits for requesting additional examinations	Clarified Microbiology samples suitable for additional requests
Section 7.3 Phlebotomy blood collection order of draw	Biochemistry: Removed LEAD from assay list on green top samples
Section 7.4 Minimum Sample requirements for Paediatric/neonatal patients	Added minimum volume required for using Urine vacutainer system Microbiology
Section 8.2 Critical Results Reporting	POCT Glucose critical results added
Section 8.2 Critical Results Reporting	Biochemistry updated critical results for FT4 and Troponin All superscript numbers relating to absent footnotes were removed. The comment "(Unless CRAD)" was removed from FT4 result.
Section 9.3 "Instructions for using Lab Enquiry / Netterm"	
Section 10 On Call	Removed testing for Victim needlestick injury.
Section 12 Test Directory	Blood Gas: Sample volume for Radiometer analyser added
	POCT Glucose added
	POCT Ketone added
	POCT respiratory viral screen added

	Pat: updated referral Test TAT for Neuropathology; Neuro oncology Beaumont 9 weeks, molecular St. James 3 weeks, Oncomine molecular St. James 4 weeks, CSF (prion) Rt-QuiC Beaumont 4 weeks, Muslce biochemistry Newcastle 4 months, Skin firbroblast 3-4 months, anti-retina antibodies 3 weeks. Updated referral Test TAT for EM; PCD Southampton Hospital 14 weeks, Renal transplant reporting 8 weeks. Update referral test and referral test TAT for histology: Thyroseq referral test TAT changed to 6 weeks. MSI referral test TAT changed to 6 weeks. Added somatic lynch syndrome referral test to Mancheseter Centre for Genomic Medicine. Add somatic BRCA testing referral to Beaumont. Updated Copper & Iron analysis referral test to 4 weeks. Updated PD-L1 referral test TATs to Poundbury 4 weeks. Added in TAT for PD-L1 (cervical) to St. Vincents. Updated Amyloidosis subtyping referral TAT to 14 weeks. Added details for sending referral tBRCA and HRD tests. Changed sample from tissue block to unstained sections, as per the national amyloidosis centre protocol. MDM2 is under St. James FISH tests. Added test details for three new referral labs; renal tumour ICC and molecular to John Radcliffe Hospital and JB9 Staining testing to Charing Cross London and Leishmanisis testing to The Diagnostic Parasitology Laboratory.
	Haem: Removed CSF Immunophenotyping - primary CNS lymphoma or CNS involvement by Leukaemia/ lymphoma (no longer being referred to St James);
	Haem: addd: Cerebrospinal fluid (CSF)- CSF collection bottles containing transfix are stored in the haematology laboratory. Test performed only by prior arrangement with laboratory. Once the CSF is added the samples are to be sent directly to the haematology laboratory NB: CSF Immunophenotyping is for diagnosis of primary CNS lymphoma or CNS involvement by Leukaemia/ lymphoma only. Samples from patients with non-haematological diagnoses will not be tested. CSF samples for flow cytometry must be taken directly into Transfix collection bottles. CSF samples are extremely labile and samples not received in transfix will not be processed if greater than 1 hour old irrespective of Microbiology or Cytology cell counts For new acute leukaemias presenting out of hours and at weekends, where the timely commencement of appropriate therapy may rely on a diagnostic flow report, the Consultant Haematologist will liaise with Flow Cytometry staff to facilitate such requests.
	Blood cultures: Blood cultures should be transported to the laboratory as soon as possible (within 4 hours) after venepuncture as delays can lead to false negative results.
	Biochemistry: Removed Free Homocystine from Test Directory.
	Biochemistry: Tests performed as part of GUT PROFILE added
	Biochemistry: TAT for Paracetamol and Salicylate to amended to 1 hour 30 mins in line with TAT for all other critical care/urgent locations.
	Biochemistry: Removed Urinary catecholamines from the Handbook as no longer available.

	Biochemistry: Specified for the following TDM tests, that the TAT for GP users for these tests is 4 days, in line with the GP TAT:Carb, Dig, Lithium, Phenobarb, Phenytoin, Theo, Valp. TAT for urgent requests will still remain at 1 day.
	Biochemistry: Specified that Biochemistry GP urgent TAT is 1 day (24 hours). Previously not stated in the handbook.
	Biochemistry: Tacrolimus now analysed on both Tuesday's and Thursday's
	Microbiology: SARS CoV 2 – SARS CoV 2 samples are processed 7 days a week with a weekend cut off for sample receipt of 12:30
	Biochemistry- updated a number of genetic tests with updated information
	Biochemistry: Updated sample requirements for Vitamin A
	Antenatal Screen: VZV IgG removed.
	Epstein-Barr Virus (EBV) IgG and IgM: Comment deleted. Turnaround time for IgG changed to 3 working days.
	Hepatitis E IgG: Comment deleted. Turnaround changed to 36 hours.
	Hepatitis E IgM: Comment deleted. Turnaround changed to 36 hours.
	Syphilis Antibody: Changed TPPA to TPHA.
	Varicella-zoster Virus IgG Antibody: Comment deleted.
	Mycobacteria culture: 'between 3 and 5 mls preferred' added to the comment re blood culture
	Microbiology: New test added: Screening for Group B streptococcus (GBS) in pregnancy
	Microbiology: Change High Vaginal Swabs to Vaginal swabs and combine Low Vaginal swabs, new comment added.
	Biochemistry: Updated sample type for ACTH
Section 14 Glossary of Abbreviations	TPPA deleted. "TPHA *Treponema pallidum* Haemagglutination Assay" inserted.
Section 15	Pat: Removed HSL-Advanced Diagnostics, Queen Elizabeth Hospital, CJD surveillance unit Edinburgh (no longer used) Added new ref lab: Cellular Pathology Services UK. Added Pathology to Referring Dept for CMD St. James Dublin. Removed Tallaght as referral lab. Added three new referral labs; John Radcliffe hospital (Renal tumour ICC and molecular), Charing Cross (DNA JB9 Staining) and The Diagnostic Parasitology Laboratory (Leishmaniasis). Biochemistry: added a number of new laboraotries.

2 INTRODUCTION

2.1 Overview

The profile of laboratory services offered has changed dramatically in recent years and continues to evolve as new technologies and methodologies are discovered. It is our hope that this User Handbook will familiarise the user with departmental policies as well as specific test requirements.

Laboratory policy statements include brief descriptions of each laboratory, location for specimen delivery, key contact personnel, the hours of operation and instructions concerning specimen collection and transportation to the laboratory. Specific criteria for refusal of requests for examination of specimens should be noted. Regretably service may not be provided if acceptance criteria are not fulfilled. Other special instructions are also included as well as details of the out-of-hours (on-call) service.

In order to obtain the best possible laboratory services, it is essential to ensure that all specimens are collected properly, and that both the specimen and request form are labelled with the appropriate information.

All tests are listed alphabetically in the "Laboratory Medicine Test Directory" with complete ordering information including the name of the test, department that will process the specimen, specimen and container required, reference intervals (where appropriate), special comments and turnaround times.

The information in this handbook is subject to change and will be updated to keep the information current.

2.2 Disclaimer

This handbook has been prepared by laboratory staff at Cork University Hospital and every care has been taken in its compilation. This handbook is intended to be used as a guide only. Practitioners should use this handbook as a guide to individual testing on the basis of clinical findings, not as a complete or authoritative statement of such testing.

Laboratory Medicine shall not be liable to users of the handbook nor to any other person, firm, company or other body for any loss, direct, indirect, or consequential, in contract or in tort or for any negligent mis-statement or omission contained herein, by reason of, arising from or in relation to any such user, other person, company or body relying or acting upon or purporting to rely or act upon any matter contained in this handbook.

2.3 Major Objectives

Laboratory Medicine is committed to providing the highest quality diagnostic and consultative services for all its users.

Major Objectives

1. To provide examinations that are fit for their intended use;
2. To provide all employees with the knowledge, training, and tools necessary to allow for the completion of accurate and timely work;
3. To provide an effective service to its users;
4. To uphold professional values and conduct;
5. To provide safe and suitable conditions for all staff and visitors to the laboratory;
6. To procure and maintain equipment and other resources needed for the provision of the service;
7. To ensure that all personnel are familiar with the contents of the Quality Manual and all procedures relevant to their work;
8. To collect, transport and handle of all specimens in such a way as to ensure the correct performance of laboratory examinations;
9. To report results of examinations in ways which are timely, confidential, accurate and clinically useful;
10. To operate a quality management system to integrate the organisation, procedures, processes and resources.

2.4 Impartiality policy

It is laboratory policy that laboratory activities are undertaken impartially and are structured so as to safeguard impartiality. The laboratory recognises that it is responsible for the impartiality of its laboratory activities and ensures that commercial, financial, or other pressures do not compromise its impartiality. It is policy that members of staff reflect the management's commitment to impartiality in all aspects of their work. The laboratory monitors its activities and its relationships to identify threats to its impartiality

2.5 Confidentiality policy

The laboratory understands that it is responsible, through legally enforceable commitments such as Irish and European Regulations, contracts with suppliers, service contracts, service level agreements, memoranda of understanding, and contracts established by the acceptance of samples, for the management of all information obtained or created during the performance of laboratory activities.

It is the policy of the laboratory that it shall inform the user and/or the patient in advance, of the information it intends to place in the public domain.

Except for information that the user and/or the patient makes publicly available, or when agreed between the laboratory and the patient (e.g. for the purpose of responding to complaints), all other information is considered proprietary information and shall be regarded as confidential.

2.6 Release of information

When the laboratory is required by law or authorized by contractual arrangements to release confidential information, the patient concerned shall be notified of the information released, unless prohibited by law.

Information about the patient from a source other than the patient (e.g. complainant, regulator) shall be kept confidential by the laboratory. The identity of the source shall be kept confidential by the laboratory and shall not be shared with the patient, unless agreed by the source.

Sharing information with third parties outside of the HSE, i.e. private or voluntary hospitals, referral laboratory specialists etc. is done on a need-to-know basis if there is a genuine need in order to ensure the highest quality of care is provided. Only information that is necessary for this purpose is shared.

Measurement of uncertainty and metrological traceability data for assays (if applicable) is available to service users upon request.

2.7 Service users

Registration details

All laboratory GP users in the region who are authorised to use the CUH laboratory are registered on the Laboratory Information System. This is achieved by importing the Name, Address, MCRN and telephone number from Healthlink, any changes should be notified to Healthlink who will inform Laboratory IT.

Contact numbers

Critical results are notified to the surgery phone number during routine hours. As the laboratory now provides an 08:00 – 20:00 service GPs may be required to be contacted outside of normal clinic hours, an out-of-hours emergency contact number is a mandatory requirement for all GPs using the laboratory's services.

Routine communication

We periodically circulate notification of changes to all the GPs registered for CUH on the Healthlink system via Healthmail

Service users may be asked to complete the Confirmation of GP Details form (FOR-CUH-PAT-1631) to ensure that the laboratory has the appropriate routine and out of hours contact details for each practice.

2.8 Service agreements

Each request, completed via a manual request form or electronically and accepted by the laboratory is considered an agreement.

All agreements take into account the request (the request form or electronic order), the examination (accredited tests methods are described on the laboratory scope of accreditation, references 199MT and 333MT on the INAB website) and the report (as described in sections 8.3 and 8.4 of this Laboratory User Handbook).

The act of completing the request form and submitting the sample and request to the laboratory indicates that the requestor agrees to the laboratory conditions for providing medical laboratory services.

This document specifies the information needed on the request form (hard copy or electronic equivalent) to ensure appropriate examination and result interpretation.

Each request form (together with its relevant primary samples) is checked for conformity with the laboratory's labelling requirements (see sections 6.2 to 6.5).

3 GENERAL INFORMATION

3.1 The location of the laboratory

Laboratory Medicine at Cork University Hospital is situated on the ground floor of the main Cork University Hospital building and can be accessed via the ground floor of the main hospital building.

The postal address of the CUH laboratory service is:
Laboratory Medicine
Cork University Hospital
Wilton
Cork City
Ireland
T12 DC4A

There are six Departments within CUH Laboratory Medicine whose main activities are described below.

Department /Section		Location
1.	Blood Transfusion	Ground floor, Laboratory building
2.	Clinical Biochemistry	Ground floor, Laboratory building.
	Molecular Genetics	Ground floor on the link corridor between outpatients and laboratory reception
3.	Clinical Microbiology	First floor, Laboratory building
	Infectious Diseases Serology	Located on the ground floor, opposite Physiotherapy department.
	Covid Laboratory	Stand alone purpose built laboratory beyond the Goods inwards entrance for stores
4.	Haematology and Coagulation	Ground floor, Laboratory building
	Haematinics Molecular Genetics	Ground floor, by outpatients Ground floor on the link corridor between outpatients and laboratory reception
5.	Pathology	
	Histopathology Cytopathology Molecular Pathology	First Floor, Laboratory building
	Electron Microscopy /Renal Next Generation Sequencing	Ground Floor, CUH (Adjacent to Theatre 9)
	Post Mortem	Ground Floor, Laboratory building adjacent to Biochemistry
	Neuropathology	Ground floor on the link corridor between outpatients and laboratory reception
6.	Autoimmune Serology	Autoimmune Serology shares the ground floor of the Laboratory building with the Haematology and Biochemistry Departments.

3.2 Operating Hours and Laboratory Telephone Extension Numbers

Prefix (021) 49 for direct access from outside Cork University Hospital.
The telephone enquiry service should be used for emergency enquiries only.

Sample Deadline denotes the cut-off for receipt of routine samples.
A detailed list of on-call tests is outlined in the section "On-Call Tests".

Blood Transfusion	Contact No	Opening Hours	Sample Deadline
Blood Transfusion Laboratory	Ext. 22537	08 :00-20 :00 Mon-Fri 09 :00-12 :00 Sat	17 :00 (Mon-Fri) 09 :30 (Sat)
Antenatal Section of Laboratory	Ext: 22668		
Blood Transfusion Laboratory Fax Number:	(021) 4922004	Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section "On-Call Tests". Non urgent specimens will be stored appropriately and processed the next working day.	
Medical Scientist On-call	Bleep:199		

Clinical Biochemistry	Contact No	Opening Hours	Sample Deadline
Clinical Biochemistry	Ext. 20173	08:00-20.00 Mon-Fri	16:30 Mon-Fri
Specific Proteins / Immunology	Ext. 22535	Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section "On-Call Tests". Non urgent specimens will be stored at 4°C and processed the next working day. **Please note: All genetic testing requires consent.**	
Biochemical Genetics	Ext. 22531		
Medical Scientist on call	Bleep: 376		

Clinical Microbiology	Contact No	Opening Hours	Sample Deadline
Clerical Office –Results/Enquiries	Ext. 22501	09:00-17:00 Mon-Fri	16:30 Mon-Fri
Main Laboratory Routine Bacteriology, Mycology and Antibiotic Assays	Ext. 22503 /22505	Limited service after 17:00 Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section "On-Call Tests". Non urgent specimens will be stored appropriately and processed the next working day.	
Infectious Diseases Serology	Ext. 22506		
Category 3 Laboratory – TB	Ext. 22823		
Category 3 Laboratory – Enterics	Ext. 22821		
Infection Control	Ext. 28074 / 28075		
Covid Laboratory	Ext. 22139		
Medical Scientist on call:	Bleep: 375		

Haematology and Coagulation	Contact No	Opening Hours	Sample Deadline
Clerical Office –Results/Enquiries	Ext. 22541	Routine hours are defined as 09:00 to 17:00, except for the following tests FBC and routine Coagulation which are analysed between 08:00 to 20:00	16:30 Mon-Fri 12 :00 Sat

		Mon-Fri, and 09:00 to 12:00 Sat	
Main Laboratory Haematinics Specimen reception Flow Cytometry Laboratory	Ext. 20172 Ext. 22128 Ext. 22547 Ext. 21351	Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section "On-Call Tests". Non urgent specimens will be stored and processed the next working day.	
Medical Scientist on call (Haematology):	Bleep: 377	Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section "On-Call Tests". Non urgent specimens will be stored and processed the next working day.	

Pathology	Contact No	Opening Hours	Sample Deadline
Histopathology (Laboratory) Secretariat Breast Secretariat	Ext:22792 Ext:22514 / 22510 Ext: 20497	08 :00-18 :00 Mon-Fri 09 :00 12 :00 Sat 08 :00-18 :00 Mon-Fri 08 :00-18 :00 Mon-Fri	16:30 Mon-Fri Fixed & unfixed specimens 11:45 Sat.
Cytopathology	Ext. 22511	9am 5pm Mon Fri No service on Sat	4.30pm
Specimen Reception	Ext. 22792		
Consultant Pathologist/clerical office	Ext.22514/ 22510/ 20497		
Post Mortem /Mortuary Services	Ext. 22525 /22883	24 hour service	11am cut-off
Perinatal Pathology Team	087 3691513	8-4pm Mon-Fri (exl. bank holidays)	Contact PNP team
Renal Pathology/Electron Microscopy	Ext 21315	08:00-16:00 Mon-Fri	Mon – Fri 8am to 15:30pm
Out of hours contact Pathologist on call via switch.			
Neuropathology Office	Ext 22520	09:00-17:00 Mon-Fri	16:00 Mon-Fri
Neuropathology Laboratory	Ext 22519		
Mobile for Consultant Neuropathologist on call: Contact CUH switchboard			

Immunology	Contact No	Opening Hours	Sample Deadline
Autoimmune Serology	Ext. 22535	08:00-17:00 Mon-Fri No service on Sat	16:30 Mon-Fri

Laboratory Medicine Information Systems	Contact No	Opening Hours	Sample Deadline
Laboratory Information Systems Helpdesk cuhit.pathology@hse.ie	Ext. 20150	09:00-17:00 Mon-Fri No service on Sat	N/A
Point of Care Testing	**Contact No**	**Opening Hours**	**Sample Deadline**
Point of Care Testing cuh.pochelpdesk@hse.ie	Ext. 20262	09:00-17:00 Mon-Fri No service on Sat	N/A

3.3 Contact Information

Name	Position	Tel Ext.	E. mail
General Laboratory Medicine			
Ms Sinead Creagh	Laboratory Manager	22532	sinead.creagh@hse.ie
Mr Paul Cantwell	Laboratory Quality Manager	20089	paul.cantwell@hse.ie
Ms Brid O'Mahony	Chief Medical Scientist – ICT	20150	brid.oMahony1@hse.ie
Ms Margaret O'Mahony	Chief Medical Scientist – ICT	20150	margaret.omahony4@hse.ie
Department of Blood Transfusion			
Dr Oonagh Gilligan	Consultant Haematologist	20111	Oonagh.Gilligan@hse.ie
Dr Mary Cahill	Consultant Haematologist	22546	MaryR.Cahill@hse.ie
Dr Cleona Duggan	Consultant Haematologist	22545	Cleona.Duggan@hse.ie
Dr Derville O'Shea	Consultant Haematologist	22548	Derville.Oshea@hse.ie
Dr Vitaliy Mykytiv	Consultant Haematologist	20111	Vitaliy.Mykytiv@hse.ie
Dr Maeve Crowley	Consultant Haematologist	22545	Maeve.Crowley2@hse.ie
Dr. Eoghan Molloy	Consultant Haematologist	34416	Eoghan.molloy@hse.ie
Dr. Clodagh Ryan	Consultant Haematologist	20963	Clodagh.ryan@muh.ie
Mr John Sheehy	Chief Medical Scientist	20346	John.Sheehy@hse.ie
Ms Bernadette O'Donovan	Chief Medical Scientist	20346	bernadette.odonovan1@hse.ie
Ms Bridget Lane	Specialist Medical Scientist: Haemovigilance Co-ordinator	22668	Bridget.lane@hse.ie
Greg O'Connor	Haemovigilance Officer (CUH)	086 0453551	Greg.Oconnor@hse.ie
Deirdre Harrington	Haemovigilance Officer (CUH)	086 0453551	Deirdre.Harrington@hse.ie
Ms Connie Foley	Haemovigilance Midwife (CUMH)	086 7872160	Connie.Foley@hse.ie
Ms Patricia O'Leary	Haemovigilance Midwife (CUMH)	086 7872163	Patricia.Oleary@hse.ie
Medical Scientist on call in Blood Bank: Bleep No:		199	
Department of Clinical Biochemistry			
Dr Sean Costelloe	Consultant Clinical Biochemist	22530	Sean.Costelloe@hse.ie
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Dr Briedgeen Kerr	A/Principal Clinical Biochemist	22531	Briedgeen.kerr@hse.ie
	Duty Biochemist (Rotating)	087-2439399	Cuh.Dutybiochemist@hse.ie
Ms Ruth Shields	Chief Medical Scientist	22809	Ruth.shields@hse.ie
Ms Elaine O'Riordan	Chief Medical Scientist	22809	Elaine.oriordan2@hse.ie
Ms Katherine Hooley	Chief Medical Scientist	22535	Katherine.hooley@hse.ie
Ms Ciara O'Connor	Chief Medical Scientist	22809	Ciara.oconnor2@hse.ie
Department of Clinical Microbiology			
Dr Marianne Nolan	Consultant Microbiologist	22500	marrianeB.nolan@hse.ie
Dr Caitriona Hickey	Consultant Microbiologist	20120	CaitrionaM.Hickey@hse.ie
D.I.Ts	Microbiology Registrars / SHO	22504 /22694/20076	
Ms Louise Barry	Chief Medical Scientist	22502	Louise.barry1@hse.ie
Dr Declan Spillane	Chief Medical Scientist (Infectious Diseases Serology)	22506	Declan.Spillane@hse.ie
Mr Eddie McCullagh	Chief Medical Scientist	22505	Eddie.McCullagh@hse.ie
Surveillance scientist	Specialist Medical Scientist	20089	
Medical Scientist on call Bleep No:		375	
Department of Haematology and Coagulation			

Name	Position	Tel Ext.	E. mail
Prof Mary Cahill	Consultant Haematologist	22546	MaryR.Cahill@hse.ie
Dr Oonagh Gilligan	Consultant Haematologist	20111	Oonagh.Gilligan@hse.ie
Dr Cleona Duggan	Consultant Haematologist	22545	Cleona.Duggan@hse.ie
Dr Derville O'Shea	Consultant Haematologist	22548	Derville.OShea@hse.ie
Dr Viyaliy Mykytiv	Consultant Haematologist	20347	Vitaliy.Mykytiv@hse.ie
Dr Meave Crowley	Consultant Haematologist	22545	Maeve.crowley@hse.ie
Dr Eoghan Molloy	Consultant Haematologist	22548	Eoghan.molloy@hse.ie
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Ms Denise Clarke	Chief Medical Scientist	22544	DeniseC.Clarke@hse.ie
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Mr Damien Hennessy	Chief Medical Scientist (Flow Cytometry)	21351	Damien.Hennessy@hse.ie
Lynne Heeney	Senior Phlebotomist	22415	lynne.heeney@hse.ie
Medical Scientist on call Bleep No:		377	
Department of Immunology			
Katherine Hooley	Chief Medical Scientist	22535	Katherine.Hooley@hse.ie
Department of Pathology			
Dr Louise Burke	Consultant Histopathologist	22127	louise.burke@hse.ie
Dr Linda Feeley	Consultant Histopathologist	20468	linda.feeley@hse.ie
Dr Tara Jane Browne	Consultant Cyto/Histopathologist	20087	tarajane.browne@hse.ie
Dr Michael W. Bennett	BreastCheck Consultant Histopathologist	20496	michael.bennett@hse.ie
Dr Julie McCarthy	Consultant Cytopathologist	20499	julie.mccarthy@hse.ie
Dr Fionnuala O'Connell	Consultant Histopathologist	22509	fionnuala.oconnell@hse.ie
Dr Rory Crotty	Consultant Histopathologist	22522	rory.crotty@hse.ie
Dr Nick Mayer	Consultant Histopathologist	20488	nick.mayer@hse.ie
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Dr Brendan Fitzgerald	Consultant Histopathologist	20135	brendan.fitzgerald@hse.ie
Dr Brian Hayes	Consultant Cyto/Histopathologist	22523	Brian.Hayes@hse.ie
Dr Niamh Conlon	Consultant Histopathologist	22454	Niamh.Conlon1@hse.ie
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Dr Orla O'Mahony	Consultant Histopathologist	20487	OrlaH.OMahony@hse.ie
Dr Frank Smedts	Locum Consultant Histopathologist	021 4234421	Frank.Smedts@hse.ie
Dr Tasheen Al Omoush	Locum Consultant Histopathologist	22885	tahseen.alomoush@hse.ie
Ms Brid Brew	Chief Medical Scientist, Pathology	22572	Brid.Brew@hse.ie
Ms Réiltín Werner	Chief Medical Scientist, Pathology	22513	Reiltin.Werner@hse.ie
Ms Marian Buckley	Chief Medical Scientist, Pathology	22513	Marian.Buckley@hse.ie
Ms Elaine Burke	Chief Medical Scientist, Pathology	20486	ElaineM.ODriscoll1@hse.ie
Mr Stephen Power	Chief Medical Scientist,	22572	stephen.power2@hse.ie

Name	Position	Tel Ext.	E. mail
	Pathology		
Ms Susan Dineen Ms Therese Brosnan Ms Bríd O'Sullivan	Perinatal Specialist Medical Scientists	087 3691513	cuh.perinatalpath@hse.ie
Mr Dan Collins Mr Kevin Lynch	Mortuary Services Manager Senior Anatomical Pathology Technician	22525/ 22524/	daniel.collins@hse.ie kevin.lynch@hse.ie
Neuropathology			
Dr Niamh Bermingham	Consultant Neuropathologist	20474	niamh.bermingham@hse.ie
Dr Michael Jansen	Consultant Neuropathologist	20475	Michael.jansen@hse.ie
An urgent on call service is provided weekdays from 9.00 am Monday to 5.00 pm Friday and a limited on call at certain weekends only. For Neuropathologist on call rota and mobile contact nos. please check with Hospital Switchboard.			
Point of Care Testing Department			
Mr Mark Butler	Chief Medical Scientist	20262	Mark.Butler@hse.ie

3.4 Availability of advisory services

1. Medical Scientists with appropriate training are responsible for technical advice. Consultant staff and their medical teams are responsible for the provision of clinical advice within each department.
2. Pathology consultants participate in multiple MDTs case discussion, providing clinical advice and interpreatation.
3. Clinical advice on ordering of examinations and on interpretation of examination results is available and can be obtained by contacting the appropriate clinical team (refer to section 3.3).
4. Interpretation and clinical advice is provided on the report where appropriate.
5. Refer to section 5.0 for further information regarding the ordering of examinations.
6. Refer to the A-Z Test Directory for a list of tests performed, samples required, primary sample volumes, special precautions, turnaround time, biological reference intervals, and clinical decision values.
7. Haematology Virtual Clinic provides a service to referring GP's, outpatient clinics, other CUH medical/surgical departments and outside hospitals whereby they receive advice and helpful guidelines from the Consultant Haematologists. The main purpose of this service is to save patients unnecessary trips to the haematology outpatient clinics which are already heavily overbooked. It allows GP's etc to follow up and treat their patients in the community as a result of the advice they receive from the haematology consultants.

3.5 The laboratory's complaint procedure

The goal of Laboratory Medicine is to ensure that our users receive accurate, reliable, meaningful and timely laboratory results. It is your right as a service user of the HSE to make a complaint if you believe that standards of care, treatment or practice fall short of what is acceptable. If you need to make a complaint, we want the process to be easy, effective and fair.

In order to help you to do so please contact the appropriate Department, the Laboratory Manager or the Quality Manager (refer to 4.3 for contact details) or one of the Hospital complaints offiers:

- https://www.hse.ie/eng/about/qavd/complaints/officers/hospital/

HSE policy and procedures for 'The Management of Consumer Feedback to include Comments, Compliments and Complaints in the Health Service Executive' can be accessed through the HSE website or by clicking on the following link:

- https://www.hse.ie/eng/services/yourhealthservice/feedback/complaints/policy/

3.6 Policy on protection of personal information

Laboratory Medicine is committed to protecting the privacy of personal information of its service users and patients. In the course of their work, health service staff are required to collect and use certain types of information about people, including 'personal data' as defined by the Data Protection Act 2018. The HSE has a responsibility to ensure that this personal data is;

- obtained fairly
- recorded correctly, kept accurate and up-to-date
- used and shared both appropriately and legally
- stored securely
- not disclosed to unauthorised third parties
- disposed of appropriately when no longer required

All staff working in the HSE are legally required under the Data Protection Act 2018 to ensure the security and confidentiality of all personal data they collect and process on behalf of service users and employees.
Data Protection rights apply whether the personal data is held in electronic format or in a manual or paper based form.

HSE policy and procedures with regards to Data Protection can be obtained through the following link:
http://www.hse.ie/eng/services/yourhealthservice/info/DP/

3.7 Instructions for transportation of samples, including any special handling needs

Instructions for the transport of specimens to the Laboratory are described in a separate procedure for Sample Transportation: PPG-CUH-PAT-36.
NOTE: All Urgent Biochemistry samples should be brought directly to the Biochemistry Laboratory and handed directly to a member of staff
Urgent samples from GP's should be sent in the bag specifically labelled 'Biochemistry Urgent Samples' to allow for prompt processing. A supply of labelled bags is available from Biochemistry.
Please contact the laboratory for information on the correct procedure for centrifugation and specimen storage prior to transport to the laboratory.

All GP Coagulation and Urgent Haematology specimens must be put into a separate transport/delivery bag, labelled 'Coagulation and Urgent Haematology Specimens only' to allow for prompt processing.

Samples for specialised coagulation must arrive into the laboratory within **4 hours** of phlebotomy.

Samples for COVID 19 testing and all CSF samples must be delivered directly to Microbiology, the pneumatic tube system should never be used.

Blood cultures must be delivered to the lab within 4 hours of collection.

4 TYPES OF CLINICAL SERVICES OFFERED BY THE LABORATORY

4.1 Autoimmune Serology

Autoimmune serology provides a service for the screening and diagnosis of a large range of autoantibody associated diseases. These diseases include Rheumatoid arthritis, Systemic Lupus Erythematosis and Coeliac disease. Immunofluorescence, Elisa and other methodologies are undertaken in this section to detect the presence of autoantibodies in the serum of patients with suspected Autoimmune disease.

While Autoimmune Serology strives to provide a comprehensive in-house service for the more commonly encountered Autoimmune diseases, some auto antibodies - associated with less frequently encountered clinical conditions require off-site analysis. These serum samples are sent to external accredited laboratories for autoantibody determination. Please note that the use of external laboratories will increase the Turn Around Times (TAT's) for these assays.

Examinations referred to other laboratories: Tests not done on-site are referred to outside laboratories for analysis. Test information is included in the test directory.

Information regarding in-house and referred tests is available in the Test Directory.
Stated volumes required apply to adult patients. For paediatric samples please send as much blood (up to adult volume) as possible.

Because individual tests are often grouped into profiles, and secondary confirmatory assays are often undertaken, small blood volumes may result in incomplete analysis.

4.2 Department of Clinical Biochemistry

Clinical services offered (including examinations referred to other laboratories)
Clinical Biochemistry is a consultant led service that provides a diagnostic, analytical and interpretative service for a large range of analytes in body fluids. Clinical Biochemistry deals with the biochemical basis of disease and the use of biochemical tests for its diagnosis, prognosis, screening and management. The laboratory provides a reliable analytical service and advice on the management of patients with metabolic disturbances.

As well as routine diagnostic work, the Department is actively involved in teaching students of medical science, science, and medicine. The Department has research and teaching links with the Departments of Medicine and Pathology of UCC and with Cork Institute of Technology Biological Sciences Department. The Laboratory is involved in collaborative research with clinical colleagues, international collaborators in the EU IST framework and postgraduate research is also carried out. Staff members contribute as lecturers and project mentors to the UCC/CIT MSc. in Biomedical Sciences. The Royal College of Pathologists recognises the department for higher specialist training in Clinical Biochemistry.

Information regarding in-house and referred tests is available in the Test Directory.
Services offered include:

- Routine Clinical Biochemistry e.g. liver, renal, cardiac, bone, glucose
- Lipids, e.g. cholesterol, triglycerides, lipoproteins
- Endocrinology, e.g. thyroid function, infertility testing, pituitary disorders
- Specific proteins, e.g. immunoglobulins, allergies, acute phase proteins

- Therapeutic drugs
- Cardiac markers
- Toxicology
- Biochemical Genetics, e.g. Haemochromatosis

Tests not done on-site are referred to outside laboratories for analysis. Test information is included in the test directory.
For advice on biochemical genetics, contact Principal Biochemist (ext 22531).

4.3 Department of Clinical Microbiology

Clinical services offered (including examinations referred to other laboratories)
Clinical Microbiology is a consultant led service that offers a comprehensive range of diagnostic services in routine Bacteriology, Mycobacteriology, Mycology, Parasitology, Infectious Diseases Serology and Molecular Diagnostics as well as consultation in microbiology, infectious diseases and antibiotic utilisation and provision of statistical and cumulative data for infectious disease monitoring. The medical team is available at all times for consultation on any aspect of microbiology and infection control.

In addition to diagnostic services, education and training are an integral part of the daily routine of the department, with established links to the Medical and Science Faculties at University College Cork and the Biological Sciences Department of the Cork Institute of Technology. The laboratory is also involved in teaching both medical and biomedical science students and is involved in collaborative research work with clinical colleagues. The department is accredited by the Royal College of Pathologists for specialist training in Clinical Microbiology.

Information regarding in-house and referred tests is available in the Test Directory.
Services offered include:

1. Routine Bacteriology: Examination of Urine, Sputum, Blood, CSF and Swabs etc.
2. Serological testing for hepatitis, HIV, syphilis, leptospirosis, etc. Please refer to the Test Directory for acceptable sample types for each test. Only the sample types specified will be tested. Any other sample types will be rejected and will NOT be tested.
3. Molecular testing for *Chlamydia trachomatis, N. gonorrhoea* and enteric pathogens is performed in-house. SARS CoV 2 and Influenza testing and Respiratory multiplex of performed in-house. Carbapenemase Producing Enterobacteriales (CPE) as approved by the Microbiology Medical Team.
4. Parasitology includes the investigation of faeces specimens for evidence of infestation.
5. Mycology: Examination of specimens such as skin scrapings and specimens from systemic infections for the presence of pathogenic fungi.
6. TB Laboratory: The investigation of specimens for Mycobacterium spp.

Tests not done on-site are referred to outside laboratories for analysis. Test information is included in the test directory.

General collection and transport guidelines:

1. Where possible, collect the specimen prior to the administration of antimicrobial therapy.
2. Collect the specimen with as little contamination from indigenous microbial flora as possible to ensure that the specimen will be representative of the infective site.
3. Collect the specimen using sterile equipment and aseptic technique to prevent the introduction of contaminating micro-organisms.
4. Collect an adequate amount of the specimen. Insufficient specimens may yield false-negative results.
5. Most specimens collected with a swab and transported dry are unacceptable.
6. Identify the specimen source and/or specific site correctly, so that proper culture media will be selected during processing in the laboratory. Special requests such as Diphtheria, Actinomyces, Nocardia etc. should be noted on the microbiology request form.
7. Specimens should be transported as soon as possible.
8. If processing is delayed, refrigeration is preferable to storage at ambient temperature, with the following exceptions:
   - Blood cultures – hold specimen at room temperature
   - CSF – hold specimen at room temperature – do not transport through pneumatic tube system
   - Mycology specimens

9. Microbial cultures submitted by other laboratories for further identification should be submitted in pure culture on the appropriate medium in a sealed, screw-capped slope. Petri plates are acceptable if properly sealed for immediate transport.

10. Include foreign travel stating country as certain diseases/infections are associated with certain parts of the world.
    Note: Telephone the laboratory if the proper procedure is in doubt.

4.4 Department of Haematology and Coagulation

Clinical services offered (including examinations referred to other laboratories)
The Haematology Department is a consultant led service that provides a comprehensive range of laboratory tests and clinical support for the management of haematological disorders.

Haematology is a regional laboratory service, in addition to stat and urgent service provision to the theatres, day services, cancer care and accident and emergency departments of CUH/CUMH, the laboratory accepts samples from Cork Dental Hospital, other citywide hospitals which have no laboratory facility (e.g. St. Finbarr's Hospital, South Infirmary Victoria Hospital), and General Practitioners. The Haematology laboratory is the referral laboratory for other HSE-South hospitals Bantry and Mallow and Kerry General Hospital, in which full range of testing is not available. The laboratory serves a catchment area of just over 450,000 for non-routine testing

As well as providing the diagnostic services provided, education and training are an integral part of the daily routine within the laboratory with established links to the Medical and Science faculties at UCC and the Biological Sciences department of the Munster Technological University (MTU). Members of staff regularly teach at both institutions. In

addition an Irish Committee of Higher Medical Training/Royal College of Pathologists approved structured training programme for Non Consultant Hospital Doctors (NCHDs) is well established within the laboratory as are trainee medical scientist programmes approved by the Academy of Medical Laboratory Science. The laboratory is also involved in both intradepartmental and collaborative research.

Information regarding in-house and referred tests is available in the Test Directory.
Services offered include:

1. Routine Full Blood Counts, ESR and Blood films
   - FBC consists of a full blood count, which includes the number of red blood cells, white cels, and platelets as well as white cell differential.
   - FBC may show evidence of: iron deficiency or Vitamin B12 deficiency anaemias, infection or inflammation, bleeding or clotting disorders, and possible haemolytic anaemias (in conjunction withof hypochromic RBCs, Reticulocyte count, and RBC morphology.
   - ESR (Erythorocyte Sedimentation Rate) detects the presence of inflammation caused by one or more conditions such as; infection, tumours or autoimmune disorders or to assist in the diagnosis and monitoring of specific conditions such as temporal arteritis, systemic vasculitis, polymyalgia rheumatic or rheumatoid arthritis. ESRs must be processed within 12 hours of phlebotomy unless stored at 4 ° C.

2. Coagulation
   - PT and INR to monitor Warfarin and Di-coumarin therapy
   - APTT to monitor intravenous Heparin therapy and the investigation of inherited and acquired bleeding.
   - Routine Screen for investigation of bleeding disorders: INR, APTT, Fibrinogen and Platelet Count. In the event of abnormal results occurring in the Intrinsic or Extrinsic Pathways the relevant Factor deficiencies are investigated including screens for Von Willebrand's disease and Inhibitor screens
   - Anti-Factor Xa to monitor Low Molecular Weight Heparin therapy
   - Platelet function abnormalities are investigated by performing Platelet Function Tests.
   - Lupus Anticoagulant screen: PT, APTT, Fibrinogen assay, AFSL, and DVVT. Anti-cadiolipin and Beta 2 Glycoprotein antibodies are also part of the lupus screen.
   - Direct Oral Anticoagulant (Apixaban and Rivoroxaban): do not require routine monitoring. However, monitoring may be required in certain circumstances e.g. when there is concern about adsorption, acute renal impairment, potential drug interactions, to estimate drug levels in the setting of bleeding. Levels should not be used to guide the acute management of a bleed as this can lead to a delay in treatment but can be helpful to differentiate the causes of prolonged bleeding (failure to clear the drug vs consumptive coagulopathy etc.).

3. Thrombophilia
   Appropriate ordering for Thrombophilia for the investigation of thrombotic episodes must be 6 weeks post thrombotic episode. Patients on anticoagulants are not suitable for Thrombophilia screening. Check BCSH guidelines published December 2010 to prevent unnecessary testing of patients, copy and paste following link to browser for

guidelines:
www.bcshguidelines.com/documents/Heritable_thrombophilia_bjh_07_2010.pdf
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.

The TAT's cited in the directory for the assays involved in the Thrombophilia Screen, refers to the time that the results are available in the Haematology Laboratory. The TAT for the full report is 3 - 4 weeks.

4. Bone marrow investigations
   Bone marrow examinations are undertaken when investigating patients for Leukaemia, Lymphoma, Myeloma, Myelofibrosis and Platelet abnormalities e.g. Thrombocytopenia / Thrombocytosis.
   Bone Marrow investigations for add on tests: contact Haematology Laboratory.

5. Flow Cytometry
   Flow cytometry is used in the diagnosis and classification of acute leukaemia, chronic lymphoid leukaemia and Non-Hodgkin's lymphoma. The technique employs flurochrome-labelled monoclonal antibodies directed against specific cellular antigens. Abnormal cell populations are characterised by multiparameter analysis, using forward light scatter, side scatter and fluorescence signals to classify /identify each cell type (immunophenotype). Other applications of this technique include immune monitoring and lymphocyte subset analysis, e.g. CD4 count for HIV.

6. Haematinic Assays
   Haematinic studies consist of serum B12, Folate and Ferritin assays.
   Vitamin B12 and Folate assays are carried out in the investigation of macrocytic anaemias. B12, Folate and Ferritin should be requested for investigation of abnormal FBC results and relevant clinical syndromes.
   Use of haematinics for screening of well patients is not recommended. **Requests should be accompanied by clinical details.** When B12 results are low Intrinsic Factor Antibody investigation is carried out. Serum Ferritin assays are performed when microcytic hypochromic anaemia is suspected, or cases of suspected Haemachromatosis. See BCSH guidelines.
   The diagnosis of B12 and folate deficiency
   http://onlinelibrary.wiley.com/doi/10.1111/bjh.12959/pdf and
   Laboratory Diagnosis of Functional Iron Deficiency
   http://onlinelibrary.wiley.com/doi/10.1111/bjh.12311/pdf
   N.B. Interference in these assays may occur in patients receiving or having diagnostic procedures utilizing monoclonal antibodies.

7. Haemoglobinopathy Screening and Glycosylated Haemoglobin Assays:
   Investigation of possible haemoglobinopathy includes the following tests:
   - HbS Screening test
   - Hb Electrophoresis
   - HbS Quantitation
   - HbA2 Quantitation
   - Hb F Quantitation

   Determined using HPLC / Electrophoresis Technologies
   Glycosylated Haemoglobin assays are used in monitoring diabetic patients as the levels reflect time-averaged blood glucose levels. HbA1c is an objective test of metabolic

control, which is independent of the patient's cooperation, the time of day, insulin administration, meals, or exercise and provides the physician with an unbiased indication of the efficacy of prescribed therapy.

8. Kleihauer testing for the estimation of feto-maternal haemorrhage and kleihauer testing for pregnancy loss

Emergency Specimens
Laboratory must be informed of specimens which are emergencies and they will be processed within time frame stated for emergencies for each test.

Examinations referred to other laboratories:
Test information is included in the test directory.

4.5 Department of Pathology

Pathology is a comprehensive consultant led service, which includes Histopathology, Frozen Section, Direct Immunofluorescence, Electron Microscopy, Diagnostic Cytopathology, Neuropathology, Molecular Pathology and a Post mortem service.
Information regarding in-house and referred tests is available in the Test Directory.

Autopsies /Post-Mortems

All persons who die in Cork University Hospital (and CUMH adult deaths) are initially transferred to the mortuary, even if an autopsy is not indicated. A body cannot be released from the mortuary and funeral arrangements cannot be finalised until the mortuary staff can verify whether or not an autopsy will be required.

Please contact the Anatomical Pathology Technician at Ext: 22525 as soon as possible after ALL deaths to help clarify these issues.
Under no circumstances should anyone commit to either scheduling a post mortem or releasing a deceased person, as this is the responsibility of the post-mortem room staff.

Coroner's Autopsies

The following types of death must be reported to the Coroner.

- Where the death may have resulted from an accident, suicide or homicide.
- Where any question of misadventure arises in relation to the clinical or pharmaceutical treatment of the deceased.
- Where a patient dies before a clinical diagnosis is made.
- Where a patient dies within 24 hours of admission to hospital.
- Where the death occurred while a patient was undergoing an operation, or was under the effect of an anaesthetic, or following an operation.
- Where the death occurred during, or as a result of, any procedure.
- Where the death resulted from any industrial disease.
- Where the death was due to neglect or lack of care (including self-neglect)
- Where the death occurred due to hospital service acquired infection
- All deaths occurring in patients who have been referred from a Nursing Home or long term residential care facility
- All deaths in association with Intracerebral haemorrhage
- All deaths occurring in Intensive Care Unit
- All deaths occurring in the Accident and Emergency Department

- Where death is due to or a contributing factor of alcohol / toxin related cirrhosis / steatosis of the liver or viral cirrhosis of the liver due to IV drug use

Do not ask the next of kin for consent to perform an autopsy examination if any of the above circumstances apply. If you have any doubt as to whether or not a death is properly reportable, consult with the Coroner who will advise accordingly. The fact that a death is reported to the Coroner does not mean that an autopsy will always be required. The Cork City Coroner (Philip Comyn) contactable through the swtichboard.

Cremation

If the family wishes to have the body cremated, the arrangements must be made by them through the Funeral Director/Anatomical Pathology Technician.

It is the policy of Cork University Hospital to refer all documents relating to cremation to the Coroners office for completion. Cardiac pacemakers and/or any radioactive implant must be removed prior to a cremation (and, if appropriate, this action notified to the Coroner).

Consented / Hospital autopsies

Do not ask next of kin for consent to perform an autopsy examination if the death is properly reportable to the Coroner. (See "Coroner's autopsies" above.) The family member granting consent should be the next of kin. Other immediate family members must not object to the examination. The doctor seeking consent (preferably SpR or Consultant) should explain fully to the next of kin the reasons for the examination, the answers sought etc. An information booklet "Information for next of kin/relatives on a hospital request post-mortem examination" EXT-CUH-PAT-665 (Form 452) is available which outlines the autopsy examination procedures at CUH and should be offered to the next of kin who is giving the consent.

The Consent to a Post Mortem Examination form (FOR-CUH-PAT-1109 (Form 450)) is quite detailed, but each section is critically important and must be completed in full. Incompletely or incorrectly filled Consent forms will not be accepted.

A Request for Post Mortem Examination form (FOR-CUH-PAT-1214 (Form 451)) must also be completed in full. Provide a brief clinical summary, the presumed cause of death, and list the specific problems to be examined.

The a) Consent form (FOR-CUH-PAT-1109 (Form 450)), b) Request form (FOR-CUH-PAT-1214 (Form 451)) and c) Medical Chart should be delivered to the post mortem room at the earliest opportunity. In addition the case should always be discussed in advance with the pathologist on PM duty.

A Consented/Hospital autopsy service is available at CUH on weekdays. This service is not available at weekends or Bank Holidays. Please note that an autopsy examination requires significant scheduling. Requests received after 11.00a.m. are unlikely to be performed that same day.

Perinatal Autopsy Examination

In the case of neonatal deaths, stillborn infants and foetuses >12 weeks gestational age, the protocol is as for an adult (see above section). Fully informed signed consent of the parent is required.

Neuropathology

Neuropathology provides a Consultant -provided quality diagnostic service mainly to Cork University Hospital for Neurosurgery, Neurology and Specialised Ophthalmology, outside referrals for approximately ⅓ of the country including all of the Cork hospitals, Tralee and Bantry and referrals from Limerick.

The following information is designed to help you use the Department:
Investigations: These include neurosurgical biopsies, neuromuscular biopsies, temporal artery biopsies, ophthalmic biopsies, CSF for Cytology, CSF for S100, 14-3-3 protein & RTQuiIC and blood for antineuronal antibodies. For advice regarding investigations contact the Consultant Neuropathologist ext 22520.

Request Forms. Please use the designated neuropathology request form for all requests. This is light grey (copies available from the Dept. extension 22520)

Patient Details. Please fill out the patient details correctly. Sticky labels are the best. Essential information for tissues must include patients MRN, full name, address, date of birth, nature of the specimen, hospital location, consultant to whom the report should be sent and relevant clinical information.

Protocols. Protocols for most investigations including muscle and nerve biopsy are available. Neurological/medical teams requesting surgeons to perform a biopsy should complete all the details on the neuropathology request form to accompany the patient to theatre. Please indicate the doctor to whom the results should go.

Autopsies/Brain referrals. For post mortems /Brain referrals on CNS disease cases please contact the Consultant Neuropathologist on duty. (Ext 22520). Coroner's cases and Consent Autopsy protocols are shared with Histopathology (see Histopathology section). Post mortem examinations that are required for investigation of unexplained or incompletely investigated rapidly progressive neurodegenerative disease/ dementia [i.e. where prion disease (transmissible spongiform encephalopathy) has not been satisfactorily excluded from the differential diagnosis) are not carried out in this institution as required biocontainment facilities are not available. For information please ring ext 22520 or the post mortem room ext 22525.

High Risk Cases. Special precautions are required for investigations on atypical dementia and other high risk cases. Fresh CNS, CSF or tissue samples must be treated carefully and decontaminated according to recommended guidelines. Please consult the Neuropathologist on duty for advice. (ext 22520)

4.6 Point of Care Testing (POCT)

The Point of Care Testing Department consists of a Chief Medical Scientist, Senior Medical Scientist and a Senior Biomedical Engineer to oversee the day-to-day running of POCT devices. POCT devices are situated outside the laboratory and give high quality results if used and maintained correctly. POCT Devices **MUST NOT** be used unless you have been trained. Training courses are organised periodically by the Point of Care Testing Department. Follow the instructions for the disposal of waste in order to minimise health, safety and cross infection risks.

1. **Blood Gas Analysers:** Analysers are located at all Critical Care Areas and in excess of 100,000 Blood Gases are performed annually in CUH. Blood Gas Analysers are located in the Emergency Department, Intensive Care Units (General and Cardiac/HDU), Theatres, CUMH Neonatal Units and Labour Wards, Cath Labs, Ward 5B and Ward GC.
2. **Blood Glucose/Ketone Meters:** Blood Glucose/Ketone Meters are located throughout the Hospital to monitor known diabetics and to detect Hyperglycaemia and Hypoglycaemia. Glucometers are **not** to be used for the diagnosis of diabetes mellitus, for which blood specimens must be sent to the laboratory (Fasting and 2 hr Post-Prandial samples). 250,000 POCT Glucose measurements are performed annually in CUH.
3. **PCR Testing** for SARS-CoV2/ FluA/Flu B, RSV: COBAS Liat POCT analysers are located in the Emergency Department for POCT SARS-CoV2/ FluA/Flu B, RSV testing. This POCT service is to support Laboratory Testing and provides short turnaround times that can improve patient triage processes.
4. **POCT Creatinine:** iStat Alinity is located in Radiology department for POCT Creatinine testing. This service is only to be used where a recent laboratory Creatinine measurement is not available.
5. **POCT HbA1c:** DCA Vantage for POCT HbA1c testing is located in the Paediatric Diabetic Day Unit and must only be used for patients who are attending this clinic.

Point of Care Testing Steering Group: The multi-disciplinary Point of Care Testing Steering Group provides Clinical Governance of the POCT Service by ensuring that systems and processes for monitoring and improving the quality of POCT services are in accordance with best practice. Membership includes (but is not limited to) the Clinical Director of Diagnostics, Consultant Clinical Biochemist, Consultant Microbiologist, Consultant Haematologist, Members of Hospital and Laboratory management, Chief Medical Scientist POCT, Nurse Management, Hospital IT and Biomedical Engineering.Applications for new POCT Services, or extensions to existing services, can be submitted to the POCT steering group for consideration.

5 INSTRUCTIONS FOR PATIENT-COLLECTED SAMPLES

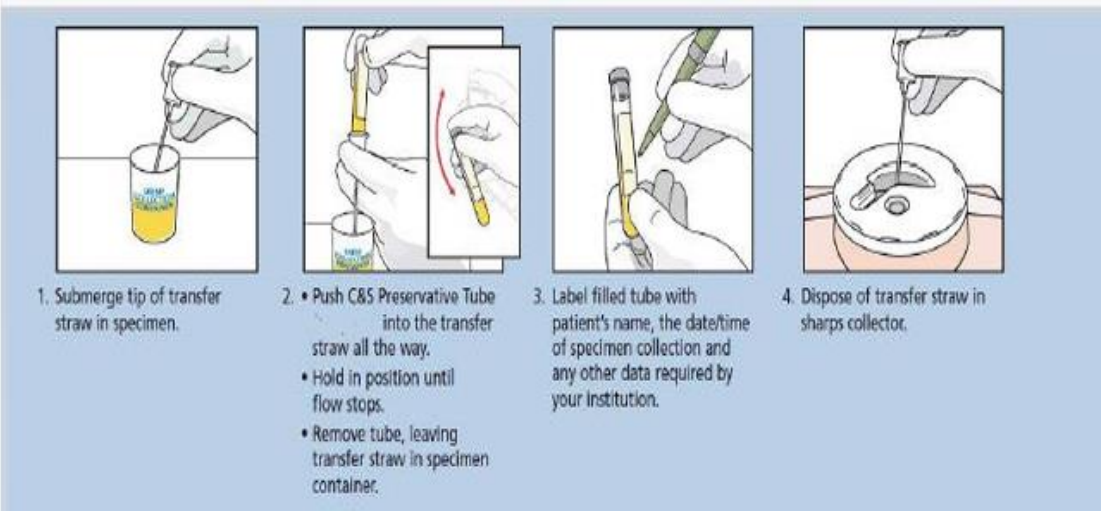
5.1 Faeces / Stool Sample Collection

1. Specimen containers are available from the clinical area or general practitioner. Faeces /stool specimens are submitted for microbiology from patients with diarrhoea or stomach upset. Sometimes, a stool is sent on a person that has had close contact with a person that has had diarrhoea.
2. The container should be labelled with your full name, date of birth (or your Hospital Chart number if you have it), date / time of collection and the sample type, i.e. Faeces.
3. The sterile container should not be opened until you are ready to collect the sample.
4. Wash and dry your hands.
5. Do not submit faeces contaminated with urine or toilet water. Urinate into the toilet if needed.
6. Place plenty of lavatory paper in a clean potty or in the lavatory pan. Make sure there is no trace of disinfectant or bleach present, as this will interfere with the test. Faeces (a bowel movement) should then be passed on to the toilet paper. Do not send stool wrapped in toilet paper to the laboratory
7. **Note:** If you have severe diarrhoea or a watery stool, a potty may be needed to collect the initial sample.
8. Open the container and, using the 'spoon' that is provided, transfer enough stool in order to fill approximately 1/3 of the container. Do not overfill the container. Also please ensure that the outside of the container is not soiled with stool.
9. You should ensure that the lid of the container is firmly closed. Note that a leaking container may be infectious. Place the container into the specimen bag attach to the laboratory request form.
10. Flush away the remaining paper and faeces down the lavatory.
11. Wash and dry hands thoroughly with soap and warm water.
12. Specimens should be brought to the laboratory as soon as possible.

5.2 Mid Stream Urine (MSU) Collection

1. Specimen containers are available from the clinical area or general practitioner.
2. The aim of collecting a mid stream urine sample is to help the doctor decide if you have a urinary tract infection (UTI or "kidney infection"). A 'mid-stream' sample is the best sample as the first urine you pass may be contaminated with bacteria from the skin.
3. The container should be labelled with your full name, date of birth (or your Hospital Chart Number if you have it), date / time of collection and the sample type, i.e. MSU.
4. The sterile container should not be opened until you are ready to collect the sample.
5. Prior to collection the genital area should be cleaned with tap water. Antiseptics should not be used. If the area is soiled, use soap and water and rinse thoroughly.
6. You should pass some urine into the toilet (discard the initial part of the urine sample); then without stopping the flow of urine, catch some urine in the sterile container (approximately half full). You should then finish passing urine into the toilet.

7. The urine sampling kit consists of a container and a straw allowing the sterile sampling of urine from the collection receptacle (not part of kit). To enhance understanding of proper urine collection, a helpful video resource (https://www.youtube.com/watch?v=idv1Dw_wlik) may be useful. The video illustrates correct procedures for urine collection, aiding both healthcare professionals and patients in optimizing specimen quality. It is important to note that the new container, distinguishable by its yellow cap (as shown in the image below), has a minimum fill line at 8ml.
8. Acceptable specimen: Midstream Urine specimen collected into a sterile receptacle. Please do not use this container for Legionella/Strep pneumonia antigen, Pregnancy tests or any Biochemistry analysis, this container is only suitable for Urine Microscopy Culture and Sensitivity Vacutainer Tube for C/S and Microscopy.
9. A minimum volume of 8ml is required this is a fill to the line on the vacutainer.
10. Transfer the Urine specimens for the sterile receptacle into the vacutainer tube immediately with the transfer straw. Do not inject or pour the sample.
11. Mix the tube 6 to 8 times by inversion



12. You should ensure that the lid of the container is firmly closed and place the container into the specimen bag attached to the laboratory request form.
13. Specimens should ideally be brought to the doctor's surgery or laboratory within 2 hours of collection. If that is not possible the sample should be refrigerated until it can be brought to the doctor's surgery or laboratory.
14. Wash and dry hands thoroughly with soap and warm water.

5.3 24 hour collection of urine

Key Points;

- Ensure that you are provided with a collection bottle (brown container) for the 24 hour urine collection before you leave the hospital.
- All of the urine passed during the 24 hour period should be collected. Failure to collect all urine may invalidate result.
- An exact timing of the 24 hour period is required.
- Ensure container is labelled with patient's full name, date of birth, date of collection and time collection was started and time collection was finished.

- Do not void urine directly into the 24 hour container but into a suitable clean detergent free container and then pour urine into the 24 hour container.
- If the container contains a preservative, please exercise care when adding urine to the 24 hour container avoiding splashing.
- Keep container away from children at all times.

Procedure;

1. Empty your bladder at 8am on rising or at a more convenient time and discard that sample. The collection period has now started. Write start time on container.
2. Collect all urine passed during the next 24 hours and place in container.
3. On the following morning empty your bladder at 8am on rising (must be the same time as starting time) and add this sample to the collection. The collection is now complete. Write the finish time on the container.
4. Close the container cap securely and ensure container and request form contain required information
5. Bring collection to the laboratory on the day of completion.

Incomplete collections;

1. If you forget and lose a sample down the toilet, then discard all urine collected up to that time and start collection again.
2. If the collection requires a preservative return the container to the laboratory and request a new container.

5.4 Sputum Sample

1. Specimen containers are available from the clinical area or general practitioner. Sputum samples are submitted for microbiology from patients with a chest infection
2. The container should be labelled with the your full name, date of birth (or your Hospital Chart number if you have it), date / time of collection and the sample type, i.e. Sputum
3. Gargle and rinse mouth with tap water to remove food particles and debris. DO NOT use mouthwash or brush teeth with toothpaste immediately before collection.
4. Open the container and hold very close to mouth.
5. Take as deep a breath as possible and cough deeply from within the chest. DO NOT spit saliva into the container. Saliva is not a suitable specimen for examination. The specimen should look thick and be yellow or green in colour. There may be fluid with some green or yellow material.
6. Avoid contaminating the outside of the container. Close the lid tightly when specimen has been obtained.
7. Place specimen in plastic bag section of request form and seal bag.
8. Bring the container and form to your GP or the laboratory as soon as possible.
9. If there is unavoidable delay in transporting the specimen to the GP or Laboratory, it may be stored in a refrigerator prior to transportation. Prolonged delays will affect test results.
10. All sputum specimens should be transported to the laboratory in tightly capped containers placed in the plastic bag (attached to the form).

11. This should ideally then be placed in another leak-proof container before transport to the laboratory.

12. *Specimens for TB testing:*
    a. Three specimens are usually required. Take the specimens on 3 consecutive days. The ideal time to collect the specimens is early in the morning just after getting out of bed.
    b. Collect and transport all specimens as described above.

5.5 HbA1c collection

1. Wash your hands and dry thoroughly
2. Increase the needle size of your testing pen by two markers
3. Remove the top from the PINK blood bottle
4. Prod your finger
5. Blood needs to be dripped into the bottle
6. **Ensure SMALL label with all relevant details is stuck to the smaller PINK topped bottle**
7. **Place small bottle in the larger universal container (MSU bottle), then in specimen bag**
8. Seal plastic bag and fill in all details on form provided
9. Place in a padded/well protected envelope
10. Post the specimen/deliver to: CODE UN 3773, Haematology Dept, Cork University Hospital

Blood sample must be submitted at least 2 weeks before clinic visit

6 ORDERING LABORATORY EXAMINATIONS

6.1 Requirements for patient consent

Issues concerning patient consent for laboratory investigations are the responsibility of the requesting doctor. The laboratories assume that specimens submitted for testing were obtained with the consent of the patient for the performance of analysis to facilitate diagnosis and treatment with the exception of the following specific tests (listed in Section 12 A-Z Test Directory) which require signed consent forms.

- Pathology
  A completed patient consent form the disposal of an amputated limb FOR-CUH-PAT-1108 must accompany amputated limb specimens.

- Haematology
  Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.
  Thrombophilia screen/ Antiphospholipid antibody screen Request Form (FOR-CUH-PAT-1575). The patient consent sections must be completed in full, if further molecular testing is required for Factor V Leiden and Prothrombin Gene (20210A) mutations.
  Note: Samples without Thrombophilia screen/ Antiphospholipid antibody screen Request Form WILL NOT be processed and samples without patient consent WILL NOT be processed for APCR, PCR for Factor V Leiden and Prothrombin Gene (20210A) mutations.

- Biochemistry
  LF-C-BIO-HHRF Haemochromstosis molecular genetic request form requires patient consent and is available on the CUH website, www.cuh.hse.ie
  A Crumlin CHI molecular genetic request form must accompany all other genetic requests (including CeGaT and NHS laboratories), available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/

- Blood Transfusion
  A completed patient consent form LF-C-BTR-HLACON for HLAB27 testing is required by the Blood Transfusion Laboratory, CUH. This form is available on the CUH website, https://www.cuh.hse.ie/our-services/our-specialities-a-z/laboratory-medicine/publications-and-downloads/

6.2 Instructions for completion of the request form

1. For accurate identification of patients and specimens, it is essential that request forms be completed fully, legibly and accurately. Please remember that inadequate information on request forms makes it impossible to issue a report to the correct location or contact the doctor in case of urgent or unexpected results.
2. The laboratory has a number of different request forms most of which are colour coded for the department. Multiple tests for one department can be sent on one request form but separate specimens and request forms are required if tests are being sent to a different department or where the sample types are different. Request forms are issued from Hospital Stores. Order supplies in advance to facilitate timely delivery.

3. The electronic request using Dedalus Clinical Manager (iCM): Refer to section 10: Information Technology.

4. The use of patient addressograph labels on request forms is recommended, except for Blood Transfusion Laboratory requests which must be hand written. On all requests forms, complete the following:
   a. Patient's Full Surname and Forename
   b. Patient's MRN (Medical Record Number). If a MRN is not available or relevant (i.e. GP patients) a date of birth and address must be supplied on the form and specimen label.
   c. Patient's Date of Birth
   d. Patient's Sex and Title
   e. Date and time of specimen collection
   f. Name of the Requesting Consultant
   g. Location to where the results should be reported
   h. Type of specimen collected and if appropriate, the anatomical site of origin or tick the relevant box
   i. Clinical information relevant to or affecting sample collection, examination performance or result interpretation (e.g. history of administration of drugs).
   j. Name and bleep number of requesting doctor
   k. Analysis required

5. If a specimen is urgent please indicate on request form and the request will be prioritised. If results are extremely urgent please contact the relevant department to discuss your requirement. Overuse of the urgent service will adversely affect the turnaround time for all urgent tests.

6. Clinical details and relevant treatment information and details of foreign travel are extremely useful to the laboratory in interpreting results.

7. Refer to the A-Z Test Directory in this User Handbook for a list of tests performed, the sample required, turnaround time and other information regarding specimen collection. The pathologist, clinical biochemist and/or laboratory staff should be consulted where uncertainty exists about the availability, appropriateness, or selection of tests, the nature of the specimen required, or the interpretation of results.

NB: All handwriting on request forms should be legible.

6.3 Format of Addressographs

The format of the labels should meet the following criteria.
The type size should be a **minimum of font size Arial 12** and follow the format

First name **Surname**
Date of birth **Sex**
Patient address
Space
Date and time of sample collection

PLEASE NOTE: Samples for Genetic Analysis **must include patient gender.**

Please complete the clinician location code and clinician name code on the right hand side of the request form in the space provided. Contact the clerical office to find out your clinician and location codes if you do not have them. It is important that the clinician name does not appear above the patient name as this will inevitably lead to errors.

Contact your software provider to ensure that your labels meet our minimum requirements.

6.4 Criteria for accepting and rejecting samples

The laboratory makes every effort to ensure that samples are processed as requested. However samples must be appropriate for the requested investigation, the safety of laboratory staff must not be threatened and there must be no ambiguity as to the identification of the patient. The criteria for sample acceptance, as described below, are strictly adhered to in the interest of patient safety. Failure to provide the required data shall lead to rejection of the specimen and request form.

6.4.1 Biochemistry, Haematology, Microbiology, Pathology

Labelling Requirements*	Essential Information	Desirable Information
Request Form	Patients full name or proper coded identifier** D.O.B. and/or Patient's Medical Record Number (MRN/RID) Patient's location or destination for report or patient's consultant or GP **Specific** requirements of individual departments: Biochemistry: - Date and time of specimen collection - Clinical details - Note: - Certain analytes may not be processed if mandatory fields are incomplete - Request must come from a Qualified Healthcare Professional. - Patient's address - Patient's sex - Haematology /Microbiology: - Test Request Pathology/Cytopathology: Requesting Clinician, Patient's address, Patient's location, Nature and site of specimen (including Right or Left) Destination for report	Patient's address Patient's sex Clinical details, relevant therapy and foreign travel (antibiotic treatment important for Microbiology), travel and prophylaxis history for Malaria Date and time of specimen collection (timing in relation to antibiotic dose **essential** for Antibiotic Assays and for some Chemical Pathology tests) Pathology: Date and time specimen taken. Previous relevant Histopathology Numbers (CUH/MUH) if applicable). Signature of clinician / nursing staff (pp) Clinician's bleep number Clinical Information
Sample	Patients full name or proper coded identifier**	Pathology: Date and time specimen taken.

	D.O.B. and/or Patient's Medical Record Number (MRN/RID) All non-blood samples: sample type or exact site Neuropathology: Autopsy brain specimens must be labelled with the PM number, the referring Pathologist and the date of the PM. Further details are at discretion of referring Pathologist. Perinatal UHK and CUMH specimens: The CUMH uses the MN_CMS Millennium Electronic record. The number of the label on the container must match the order number of the request.	
Requests using iCM	Samples requested using iCM have no accompanying forms. Details must be complete on the sample container.	

* The identifiers which appear on the sample container must match the information provided on the accompanying request form
**e.g. HIV specimens

6.4.2 Blood Transfusion

Labelling Requirements*	Essential Information	Desirable Information
Request Form	Addressographs on forms not accepted. Patient's Forename§ Patient's Surname§ Patient's Sex D.O.B. Medical Record Number (MRN/RID) Patient Address for Out-patients. Destination for report. Patient's consultant or GP. Identity of person taking the samples (Doctor's MCRN or Nurse/Midwife Bord Altranais PIN if possible) including contact details of person taking the sample (e.g. Bleep or telephone). Date and time of specimen collection. Tests Required. §For patient's whose identity is unknown (e.g. Unconscious or Major Emergency scenario) the use of pseudonyms/MRNs as per Emergency Department protocols will be accepted. **Note:** The CUMH uses the MN_CMS Millennium Electronic record. Transfusion forms generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department. In CUH, Blood Track™ system generated labels used on forms are accepted.	Clinical details. Previous address & patient's maiden name Transfusion & obstetric history & relevant therapy.
Sample	Addressographs on samples not accepted. Patient's Forename§ Patient's Surname§ Patient's Sex D.O.B. Medical Record Number (MRN/RID). Identity of person taking the samples	

	Date and time of specimen collection. §For patient's whose identity is unknown (e.g. Unconscious or Major Emergency scenario) the use of pseudonyms/MRNs as per Emergency Department protocols will be accepted. **Note:** The CUMH uses the MN_CMS Millennium Electronic record. Transfusion specimen labels generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department. In CUH, Blood Track™ system generated labels used on samples are accepted.	
Requests using iCM	Blood Transfusion Samples are not to be Requested using iCM and will not be processed.	

*The identifiers, which appear on the sample container, must match the information provided on the accompanying request form

6.5 Irreplacable Samples – Minimum Labelling Requirements Not Met

1. In the event that minimum patient identification labelling requirments or where sample acceptance criteria are not met for irreplaceable samples, e.g. CSFs, tissue samples, certain fluids etc., the clinician or clinical team taking responsibility for labelling the sample will be contacted and requested to resolve the discrepancy.
2. Requests may be processed but reports withheld until the anomaly is resolved.
3. Haematology: In the event that minimum patient identification labelling requirments are not met for irreplaceable samples, e.g. Bone Marrow aspirates, Paediatric specimens. The laboratory will contact the requesting clinician to come to the lab in person to complete and sign FOR-CUH-PAT-2027 (Haematology discrepancy label for irreplaceable specimens), the clinican will have an opportunity to resolve the discrepancy and to accept clinical responsibility. The final report will indicate the nature of the discrepancy.

6.6 Time limits for requesting additional examinations

Users may request additional examinations on specimens already sent to the laboratory. To request the add-on tests use the form titled "Request Form for Additional Tests on Sample Previously sent to Laboratory Medicine" reference FOR-CUH-PAT-1732.

Analyses for additional tests are subject to the stability of the analyte. 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 requesting additional examinations for each department is given below:

Department	Time Limit
Autoimmune Serology	Within the 14-day specimen retention time (dependant on storage facilities) and subject to individual analyte stability.
Biochemistry	The time limit for requesting additional examinations is generally within 5 days subject to individual analyte stability and dependant on storage facilities. Certain tests have a limited stability:

	• Anti-TPO • CK • CSF • Total and Direct Bilirubin	• Phosphate • LDH • HCG-B • Oestradiol	• Troponin • SHBG • PTH
	Please contact the laboratory with any queries.		
Haematology	Not all add-on tests can be accommodated; the factors influencing the capability of requesting Add-On Tests include storage requirements and stability of parameters measured. Please contact the laboratory with any queries. The following is a list of the most common assays: - Retics on FBC specimens **<12** hours post phlebotomy - ESR **<12** hours post phlebotomy - Blood Films: Manual differential and Red cell morphology **<12** hours, slide Platelet check **<72** hours post phlebotomy. - DDI on Coagulation Sodium Citrate **<24** hours post phlebotomy - APTT on Coagulation, Sodium Citrate specimens **<4** hours post phlebotomy - HbA1c on FBC specimens 48 hours after receipt in laboratory - Haemoglobinopathies on FBC specimens 48 hours after receipt in laboratory - Haematinics on clotted specimens – extra assays 48 hours after receipt in laboratory - Flow Cytometry on FBC specimens – contact laboratory - Fibrinogen **<12** hours post phlebotomy - Malaria on an FBC sample (**12** hours post phlebotomy) - Kleihauer: the time limit is **72** hours post delivery - G6PD **<24** hours post phlebotomy ***Please contact the laboratory about additional test request queries for assays that do not appear on the above list***		
Microbiology	The only samples that are suitable for additional requests are the following: • Infectious Diseases Serology – Blood samples are stored for approximately 1 week from reception date, therefore, additional testing can be requested at any stage during this time. • CSF samples are stored for approximately 2 week from reception date, therefore, additional testing can be requested at any stage during this time. • Any irreplaceable sample within its retention period e.g tissue from surgery. Request directly with Microbiology medical team In all other instances a new sample is required.		
Molecular Genetics	Factor V Leiden and Prothrombin gene mutations - add on not possible as separate specimens always required for genetic testing		
Blood Transfusion	Blood Transfusion Samples are valid for 72 hours. Exceptions may be facilitated in e.g. in the case of Placenta Praevia and/or subject to consultant haematologist approval.		

Please contact the appropriate laboratory for more detail on the time limits for requesting additional examinations

6.7 List of factors known to significantly affect the performance of the examination or the interpretation of the results

Many sources of error exist that could affect the examination result. Refer to the A-Z Test Directory in this User Handbook for any special rejection criteria that may apply. Listed below are some of the major pre-examination reasons for test cancellation or delay.

Request form problems that will cause test cancellation or delay:

- Illegible patient demographics, illegible name of ordering clinician or incorrect ward /location
- Absent or incorrect patient identifier (e.g. MRN/RID or PPI)
- Absent or incorrect time and date of request
- Unclear or totally absent marking of test request boxes
- Type of body fluid not identified
- Form contaminated by specimen

Specimen problems that will cause test cancellation or delay:

- Leaking containers (rejected because of infection risk)
- Sample is unlabelled, incorrectly labelled or does not match the accompanying form
- Too few specimens or an insufficient volume for analysis. Send separate samples for each department. Split a CSF sample when requesting both cell count/culture and biochemistry. Send separate samples for in-house and send-out (reference laboratory) tests
- Misrouting of specimens e.g. inappropriate laboratory
- Incorrect lab request form used
- Sample collected into an incorrect preservative/anticoagulant
- iCM labels containing bar codes must be aligned with the original container label

Note: Large loose labels on specimens cause loss and damage to samples and costly damage to analysers

7 SPECIMEN COLLECTION

7.1 Instructions for preparation of the patient

Patients can help to ensure that their lab tests are accurate by following pre-testing instructions carefully and by providing complete medical histories, including lists of medications to their health care providers.

Variables that could affect test results

- Patient variables including exercise, diet, age, sex, circadian variation, posture, obesity, stress, smoking and medication may affect laboratory test results.
- An individual's diet and lifestyle may affect laboratory test results. It is generally recommended that the night before laboratory tests patients avoid high-fat foods, alcohol and strenuous exercise.
- Patients should ask their doctors if certain medications should be stopped prior to lab testing as certain medications may interfere with the laboratory test results.

Blood Tests

- Patients may need to fast prior to certain blood tests. For example, patients should not eat or drink anything except water for 9 to 12 hours prior to glucose and lipid profile tests.
- The amount of blood drawn at the time of collection for laboratory testing depends on the tests that are ordered. Usually the amount collected is very small (around 3-6 teaspoons.)
- Some patients become anxious when they have their blood drawn. Patients should tell the health care professional who is drawing the blood if they feel faint or sick. Slow deep breaths prior to the needle stick may help to alleviate anxiety.

- After a blood draw, the phlebotomist makes sure that all signs of bleeding have stopped. A bandage is applied to the arm for a minimum of 15 minutes.
- Aspirin or other anticoagulant (blood thinners) drugs can prolong bleeding. In such cases, patients may need continued applied pressure until the bleeding has stopped. A cold pack may be necessary to reduce swelling and bruising.
- After a patient has blood drawn, even when bleeding has stopped, patients should not carry or lift a heavy object with that arm for a minimum of one hour.

SARS CoV 2 sampling

- Refer to HSE link below for video https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/sampling

Collecting Specimens at Home

- Patients must follow all instructions exactly for collection of specimens performed at home then brought to the laboratory for testing.
- Special containers with a powder or liquid preservative may be provided for urine collection. Patients should never empty or discard any powder or liquid from the container before beginning the collection of a specimen.
- Specimens should be delivered to the laboratory in the prescribed timeframe in order to assure accurate results.

Results

- Depending on the laboratory work performed, test results may be available within a few hours to as long as several weeks.
- Laboratory test results are often reported with a reference interval to assist the clinician in interpreting them. These reference intervals reflect the values in the majority of healthy individuals; however, a small number of healthy people (5%) may have results that are higher or lower than those in the reference range. Therefore, laboratory results should interpreted by clinicians who can decide whether or not the results indicate a medical condition.
- Clinicians consider personal medical history, family history, and results from physical examination when interpreting an individual patient's laboratory test results.

7.2 Phlebotomy Service at Cork University Hospital

Senior Phlebotomist: Ms Lynne Heeney
Contact Numbers: Phone: 22415 (Blood Room) 22353 (Phlebotomy office)
Phlebotomy is based in the Out-Patients Department for Warfarin clinic and Oncology Clinics. All other Out-Patients and GP patients are required to attend Blood room in St.Catherines by appointment only.

Wards: The service is Monday to Sunday
Electronic orders **must be placed before 6.30.**
Weekend /Bank Holiday for non-routine bloods, limited services.

Awbeg suit Blood Room: Warfarin and Oncology patients **ONLY**
Warfarin Clinic

Monday – Friday 7:30 – 13:00 (except Wednesday)
Oncology Bloods
Monday – Friday 9:00 - 13:00
Monday – Thursday 14:00 – 16:30

Cedar Building Blood Room

Diabetes & Endocrine patients **ONLY**

By apointment **ONLY**
ONLINE booking available HERE.
Phone number 021/423-4910
Tuesday 7:30am-13:00pm and 2:00pm-4:30pm
Wednesday 7:30am-13:00pm
Thursday 7:30am-13:00pm and 2:00pm-4:30pm

St. Catherines Blood Room:

All other Consultant clinics
By apointment **ONLY**
ONLINE booking available HERE.
Phone number: 021/423-4910
Monday – Thursday 7:30 – 16:30
Friday 7:30 – 16:00

The Phlebotomy Department provides a varied service within the hospital. It covers the Paediatric wards, all the adult wards, the psychiatric unit and the Emergency Department. The Blood Room clinic provides an important Paediatric out-patients service to the General Practitioners in the City and County.

Health and Safety

- Universal precautions are adhered to at all times.
- Gloves to be used when dealing with patients.
- Gloves to be changed after each patient.
- Needles not to be recapped after use.
- Needles and Holders to be disposed of safely.
- Sharp bins provided for disposal of sharps.
- Clinical waste bags provided for any bloodstained material.
- Spillages /blood – Appropriate disinfectant to be used to clean and disinfect.
- Large spillages of blood /body fluid contact Housekeeping (protocols laid down by infection control)

Prion Disease:

1. It is essential that all CSF samples from patients who have Prion Disease in their differential diagnosis be managed in the following manner
2. Each laboratory likely to receive the CSF must be informed.
3. The sample and form should be appropriately labelled.
4. Information regarding suspected Prion disease MUST be indicated on the request form
5. The CSF, in a universal container, is double-bagged and marked with a biohazard label.

7.3 Phlebotomy blood collection order of draw

Specimen Volume	Order Of Draw	Closure Colour	Tube Contents	Assays
5ml		Black	Not for analysis and used to prime the line	Prior to collecting blood samples from a newly inserted peripheral venous cannula(PVC) Prior to collecting a coagulation sample using a butterfly needle
3ml		Blue	Trisodium Citrate solution	Coagulation Studies
4ml		Red	Separation Gel Clotting Accelerator	Biochemistry Profiles, Viral Studies, Hormone Studies, Immunology, Anti Cardiolipin AB., B12, Folate, Ferritin, RA, Intrinsic Factor AB, Iron Studies, CRP's, TDM (Therapeutic Drug Monitoring),
4ml		Red	Clotted (Gel free)	Cryoglobulins, Methotrexate
4ml		Green	Heparin	Chromosomes, FISH
3ml		Purple	EDTA	FBC, HBA1C, Hb. Electrophoresis, Malaria Parasites, Sickle Cell, Reticulocyte Count, Coombs Test, Cyclosporin,Tacrolimus ESR, Immunophenotyping, PTH, Cryogobulins DNA Analysis, Microarray
6ml		Pink	EDTA	Crossmatch, Group & Antibody Screen
4ml		Grey	Sodium flouride	Glucose, Fluid Glucose, Glucose Tolerance,Lactate, Alcohol Levels
9ml		Yellow	ACD-A	HLA Typing

7.4 Minimum Sample requirements for Paediatric/neonatal patients

The volume of serum/plasma obtained from blood depends on the haematocrit; therefore measurement of these analytes may require a larger volume of blood from patient with high haematocrit.

Test	Sample Type	Minimum Volume	Additional Requirements
U/E, Creat, Ca, Mg, Phos,Bili, Lfts	Li Heparin or clotted sample (orange top/clear top)	1ml	
TFT's	Li Heparin or clotted sample (orange/clear top)	0.75ml	
Glucose	Fluoride oxalate (yellow top)	0.5ml	
Ammonia	Li Heparin (orange top)	0.5ml	
Blood amino acids	Li Heparin (orange top)	150ul	
Urine amino acids	Urine	4mls	
Organic Acids	Urine	4mls	
Acylcarnitine	Blood spot		
Very long chain fatty acids	EDTA or Lithium Heparin	2ml	
Lysosomal enzymes	EDTA	5ml	16 enzymes measured here, specific enzymes can be requested with a sample volume of 3ml
Transferrin isoforms	Clotted sample (Clear top)	0.75ml	Not for babies <3 weeks
Biotinidase	Li Heparin	0.5ml	Frozen in <1hour
Free fatty acids and β-hydroxybutyrate	Fluoride oxalate	2ml	
Insulin and C-peptide	Clotted sample	2ml	Haemolysed samples unsuitable
Growth Hormone	Li heparin or clotted sample	1ml	
Cortisol	Li heparin or clotted	0.75ml	
17-hydroxyprogesterone	Li heparin or clotted	1 ml	Only after 48hrs post birth
Mycophenolate	EDTA	1ml	Spin <6hrs
Haematology Test: FBC	EDTA	1mL purple or 1.3 mL red	
Urine Microscopy and Culture in Boric acid vacutainer system	Urine	8ml	

7.5 Sample Storage Conditions

Biochemistry

1. Store blood and urine samples at **room temperature**, unless otherwise specified.
2. For the addition of test requests to existing samples, please contact the laboratory for advice on sample integrity.
3. If a delay arises, please contact the laboratory for advice on sample integrity (Tel: 021-4922528)

Haematology

1. If delays are unavoidable, Haematology specimens can be preserved by refrigeration at 2-8°C in a designated specimen fridge e.g. Full Blood Counts, HbA1c, Haematinics
2. Coagulation samples for INR must be stored at 18-22°C (Refrigeration may lead to cold activation of coagulation factors)
3. For the addition of test requests to existing samples, please contact the laboratory for advice on sample integrity. If a delay arises, please contact the laboratory for advice on sample integrity

   Exceptions to this include:
   a. Coagulation specimens for APTT need to be assayed within 4 hours of phlebotomy
   b. Samples for Flow Cytometry should be sent to the Haematology ASAP, ideally on the day of Venesection, at room temperature. If a delay is anticipated and is needed to be kept overnight, store at 2-8°C in a designated specimen
   c. Malaria tests must be examined on the day of venesection, therefore is not suitable for storage
   d. Bone marrows and Kleihauer (Foetal cells) must be sent immediately to Haematology

Microbiology

1. In most cases, if delays are unavoidable, microbiology specimens can be preserved by refrigeration at 2-8°C in a designated specimen fridge, as this maintains the viability of the pathogens present and prevents the overgrowth of non-pathogenic bacteria. Exceptions to this include:
   a. Blood Cultures - Do not refrigerate or place on radiators, incubators or direct sunlight. The pneumatic tube can be utilised to transport **plastic** blood culture vials and is preferable to avoid unnecessary delays.
   b. CSF should be held at room temperature.
   c. Faeces Samples for Ova, Cyst and Parasite investigation should not be refrigerated (should be stored at room temperature).
   d. Molecular Investigation: Viral swabs for SARS CoV-2 and other Respiratory Viruses are provided directly from the Microbiology Department and should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8^{o}C.
   e. Collection swabs for Molecular Investigation of Carbapenemase Producing Enterobacteriales (CPE), will be provided by the Microbiology Derpartment by liaising with Medical Microbiology Team and should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8^{o}C.

Microbiology (Infectious Diseases Serology)

Clotted Blood and EDTA Blood for Molecular Investigations

Serum and plasma must be removed and frozen at ≤-20°C by the laboratory within 24 hours of venepuncture to maintain the integrity of viral nucleic acid. Therefore, samples must be sent to the laboratory without delay. Samples received greater than 24 hours from collection will NOT be processed.

Clotted Blood for Serological Investigations

Specimens should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8°C.

Oral Fluid

Oral fluid specimens should be collected using commercially available collection devices such as OraCol™ or OraSure™. Please contact the laboratory for further information. Please transport without delay (particularly for molecular investigations). If delay is unavoidable, please store at 2-8°C.

Respiratory Secretions

Respiratory viruses are extremely thermolabile and therefore should be transported to the laboratory without delay. The quality of the sample is a major determinant in identifying the causative agent. If delay is unavoidable, please store at 2-8°C.

Stool

For molecular detection of viruses associated with gastroenteritis, specimens should be transported to the laboratory as soon as possible post collection. Alternatively, specimens may be stored at 2-8°C for up to 72hrs before dispatch.
Stool for Strongyloides culture or Ova, Cyst and Parasite investigation must NOT be refrigerated. Send to the laboratory without delay.

Urine

Specimens should be transported without delay (particularly for molecular investigations). If delay is unavoidable, please store at 2-8°C.

Viral Swabs

Swabs should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8°C.

Pathology

Prolonged formalin fixation may have an adverse effect on subsequent molecular techniques. Specimens in Buffered Formal Saline should be stored at ambient temperature.

Neuropathology:

1. CSF/CNS fluids should be stored at 4°C if any delay occurs prior to delivery to the laboratory.
2. Any details of storage conditions should be recorded on the form.

Cytopathology:

Samples for cytological examination will deteriorate with time and should therefore be transported to the laboratory as soon as possible. In the event of a delay, samples should be stored at 2-8°C.

8 REPORTING OF RESULTS

8.1 Turnaround Times

Turnaround time (TAT) is given as the maximum number of working hours/days between sample receipt and issuing a report either in the computer or by phone under normal operating conditions. In addition to the routine service each department operates an "urgent" system whereby the target turnaround time is shorter. The turnaround time for individual tests is given in the A-Z Test Directory in this User Handbook.

Overuse of the urgent service will adversely affect the turnaround time for all urgent tests. Many specialised tests are performed on a weekly basis; if such tests are required urgently please phone the appropriate laboratory to discuss the request.

TAT are routinely monitored as part of the laboratories quality improvement program.

8.2 Critical Results Reporting

Critical results will be communicated by the laboratory, therefore it is essential that up to date contact details are available for the routine day and out of hours. The laboratory requires phone details that are appropriate to receive critical results in a timely manner from all users.

Biochemistry

Test	Result
ALT	>510 U/L (Female) >675 U/L (Male)
AST	>630 U/L
Ammonia	>100 µmol/L
Amylase	>600 U/L
Bicarbonate	<10 mmol/L
Bilirubin (conjugated)	>25 µmol/L (Neonates only)
Calcium (adjusted)	<1.8 mmol/L >3.0 mmol/L
Calcium (Paeds)	<1.8 mmol/L >3.0 mmol/L
Cortisol	<50 nmol/L
Creatinine	>345 µmol/L (≥200 µmol/L if <16 y.o.) An increase of 1.5 times from the lowest value in the last 0-7 days.
CK (total)	≥5000 U/L
CRP	300 mg/L (primary care only)
Digoxin	>2.5 µg/L
Ethanol	400 mg% (Please note mg% is the same as mg/dL)
FT4	<4.1, >50 pmol/L

Test	Result
Glucose	<2.5 mmol/L >25 mmol/L ≥15 mmol/L if <16 y.o.) >30 mmol/L in known DM
Potassium (K)	<2.5 mmol/L >6.5 mmol/L
Lactate	>4.0 mmol/L
Lithium	>1.5 mmol/L
Magnesium	<0.4 mmol/L
Sodium (Na) (Including Direct Sodium)	<120 mmol/L (<130 mmol/L if < 16 y.o.) >160 mmol/L
Paracetamol	>30 mg/L (4 hours post ingestion)
Phosphate	<0.35 mmol/L
Phenytoin	>28 mg/L
Salicylate	>300 mg/L
Triglycerides	>20 mmol/L
Theophylline	>25 mg/L
Troponin (ED only)	>50 ng/L (Male & Female)
Urea	>30 mmol/L (≥ 10 mmol/L if <16 y.o.)

Haematology

Test	Result		Test	Result
WBC x 10^9/l	<1.00		HB g/dl	<7.0
WBC x 10^9/l	>35 (GP), >50 (Ward)		HB g/dl	>17(F), >19(M)
PLT x 10^9/l	<50		PLT x 10^9/l	>800 (GP), >1000 (Ward)
Neutrophils	< 0.5 x 10 ^{9}/l (0.5 - 1.0 phoned next day)		CD4	CD4 <200 absolute count (unexpected or 1st time)
Kliehauer	Foetal bleed >12 mls		Fibrinogen	<1.0
APTT	> 100 secs		Factor Xa	>1.0 IU/mL
D-Dimer	>35.2mg/L FEU		DOACs	Rivoroxaban >419 ng/ml Apixaban >321 ng/ml
INR	>4.5 (>4.5 and <5.0 and GP - Next morning OK all others to Sth doc)			

Any significant drop in the **HB** level e.g.>2g/dl if baseline Hb is </= 8.0 g/dl and >3g/dl if baseline Hb is </= 9.0 g/dl

Positive sickle cell screens in patients with *pre-op* indicated on form

Positive HCGs in hospitalised in-patients

Urgent Factor assays

Haemolytic Uremic Syndrome

Newly diagnosed Leukaemia's

Positive Malaria infections

Positive Monospot Screening test

Equivocal Pregnancy Tests

Microbiology

Microscopy

- Positive gram stains: blood cultures, CSF's and normally sterile body fluids, e.g. joint aspirates
- New ZN positive smears

Culture

- Positive blood cultures
- Positive CSF cultures
- Positive cultures of normally sterile body fluids, e.g. joint aspirates
- New MRSA, VRE or other multi drug resistant organisms
- Gonococci (except to STI clinic)
- New Mycobacterial culture positives
- Skin and soft tissue Group A Streptococci

Enterics

- New positive results: bacterial, viral or parasitic

Infectious Diseases Serology

Laboratory Test	*Result*	*Category*	*Comment*
Toxoplasma IgM	Positive	C	Pregnant patient
CMV IgM	Positive	C	Pregnant patient
Rubella IgM	Positive	C	Pregnant patient
Parvovirus B19 IgM	Positive	C	Pregnant patient
HIV Ag/Ab	Positive	C	New detection
HBsAg	Positive	C	New detection
Anti-HCV	Positive	C	New detection
Syphilis Antibody	Positive	C	First detection in pregnant patient
Urinary Antigens	Positive	C	

*Category C: Telephone communication of results on the next working day at the latest.

Pathology

Frozen section reports

All positive temporal artery biopsies (Neuropathology)

Other reports at the discretion of the reporting Pathologist

POCT

Blood Gas Samples

Test	Critical Results Arterial	Critical Results Venous	Critical Results Capillary	Units
pH	<7.2 >7.6	<7.2 >7.6	<7.2 >7.6	
pCO2	<2.6 >9.3			kPa
PO2	<6			kPa
Na+	<120 >160	<120 >160	<120 >160	mmol/L
K+	<2.8 >6.2	<2.8 >6.2	<2.8 >6.2	mmol/L
iCa^{++}	<0.5 >1.58	<0.5 >1.58	<0.5 >1.58	mmol/L
Glu	<2.2 >24.9	<2.2 >24.9	<2.2 >24.9	mmol/L
Lac	>2	>2	>2	mmol/L
Bicarb	<10 >40	<10 >40	<10 >40	mmol/L
Hb	<7.0	<7.0	<7.0	g/dL

Note: It is the responsibility of the POCT Operator to act immediately on any critical results and/or inform the appropriate clinician.
For unexpected significant results that are not consistent with the clinical picture, where the results require clinical intervention, or where the Operator is not reassured by the POCT result, a repeat sample should be run or a sample should be sent to the lab for confirmation.
Advice on critical results may be obtained from Duty Biochemist at Ext: 22870

POCT Creatinine

Test	Units	Critical Result
POCT Creatinine	µmol/L	≥ 300
POCT eGFR	ml/min/1.73m²	≤ 30

POCT Glucose

Test	Units	Critical Result
POCT Glucose	mmol/L	≥ 15 if <16 years >25 adult

8.3 Printed Reports

1. Reports are printed with reference ranges and/or suitable comments wherever appropriate, to aid interpretation of results. Reports will only be given to the submitter. Private individuals will not receive reports.
2. Please note the printed authorised report (or an amended subsequent report) issued by Laboratory Medicine is the medico-legal document within the patient record.
3. Printed reports are delivered by the portering staff to CUH wards.
4. External hospitals are printed and issued as follows:

• Bon Secours Hospital	Posted
• Mallow General Hospital	Collected daily
• Mercy University Hospital	Collected daily
• St. Mary's Campus	Collected daily
• St. Finbarr's Hospital	Collected daily
• South Infirmary Hospital	South Infirmary porter collects reports periodically throughout the day.
• University Hospital Waterford	Posted
• University Hospital Kerry	Collected daily
• University of Limerick Hospital Groups	Posted (to UHL) and collected daily

5. Results for General Practitioners are printed and posted daily.
6. Emergency, critical and urgent positive reports are phoned directly to the wards and/or ordering clinician.
7. Results are electronically sent to some General Practitioners who have registered with GP messaging for more information (see below).

Pathology: Responsibility for receipt of report lies with the requesting clinican

GP Messaging - Electronic delivery of laboratory reports to the GP practice

Laboratory Medicine facilitates the issue of electronic reports to GP practices. This is facilitated using Healthlink messaging. Healthlink is the national standard for messaging between Hospitals and General Practitioners. Laboratory Results can be either viewed directly on Healthlink or integrated into Practice Management Software

Electronic laboratory facilitated reports are issued for Biochemistry, Haematology and Microbiology only.
Electronic reports are issued from Laboratory Medicine in real time. To avoid reports going to the wrong GP practice it is best to clearly print your laboratory GP location code on any test request forms being sent to Laboratory Medicine. Some practices have their laboratory GP location code incorporated into their practice stamp or on their computer generated address labels.
If you do not know your laboratory GP location code contact Laboratory Medicine at CUH on 021-4921309.

For those who are using Healthlink messaging, it is vital to regularly check reports imported into your PMS with either printed or from the Healthlink website.
This is to ensure that results, reference ranges, demographics etc are being transferred correctly from Laboratory Medicine to your PMS.

If you have any problems with any aspect of GP messaging your first point of contact is your GPPMS software provider or the Healthlink (01) 828 7115 or email support.healthlink@healthmail.ie

8.4 Electronic Reports within CUH/CUMH

The Laboratory Information System (iLaboratory) has HL7 interfaces to the following Clinical Information Management Systems thus allowing the transmission of laboratory results immediately upon authorisation in the lab.

- **DAWN**
  DAWN AC (DINR) Anticoagulation software is a medical application designed for managing large anticoagulation clinics. It determines the patients wafarin dosage based on their INR result.
- **eMed (Renal)**
  eMED*Renal* is a national clinical and patient management software system designed for renal patients.
- **iCIP**
  The IntelliVue Clinical Information Portfolio (iCIP) is a software suite designed to centralise patient data so clinicians have access at the patient's bedside in specific locations e.g. ICU, to the information they need to make clinical decisions. The patients MRN must contain a '**C**' prefix and they must be admitted to ICU in order for reports to download to this system.
- **iCM**
  The iSOFT.Clinical Manager (iCM) application is an electronic health record for patients. It has many features to help organise patient information. These include placing electronic orders for tests and viewing their results. The patients MRN must contain a '**C**' prefix in order for reports to download to this system.
- **Maternity System**
  The MN-CMS is an Electronic Health Record (EHR) for all women and babies who access the Maternity Services in Ireland. This system provides accurate and up to date clinical information to all those involved in the care of mothers and babies in our maternity units, allowing for their information to be shared with the relevant health care providers that need to access the data for the provision of care.

9 INFORMATION TECHNOLOGY

9.1 Laboratory Medicine Results Access Policy and Confidentiality Guidelines

Laboratory medicine results are stored on a Laboratory Information System [LIS]; the system is currently i.Laboratory. All hospital medical, nursing and relevant clerical staff are granted access to the full range of patient data held, subject to the terms and conditions as outlined in this policy. Non hospital HSE contracted medical, nursing and relevant clerical staff are also granted access – either to data restricted and relevant to patients in their practice area e.g. Community hospitals and GPs; or to the entire range of patient data, e.g. public health staff.

The applicant will ensure that there is tight control on access to patient pathology results via Lab Enquire in their ward, office *etc*.
Please note: Histopathology results are only for look up/internal purposes and are not official Histopathology results and should not be used in any correspondence.

The applicant is responsible for the proper use of the facility.

- Usernames and Passwords must not be shared.
- Any patient specific information gained through work or on receiving reports from Laboratory Medicine is strictly confidential and must not be relayed or discussed with any third party unless they are specifically authorized to receive the information.
- Never examine any material or report that is not pertinent to your work.
- Only a doctor may authorise Laboratory Medicine information being passed to a third party. The points outlined in the Medical Council Guidelines section 31.03 should be borne in mind by any doctor passing information to a third party.
- All patient identifiable information must be held securely and locked away when not personally attended; such data must never be stored on removable storage devices (USB memory key, floppy disk, CD/DVD).
- If patient identifiable information is entered on computer, that computer should be password protected
- Never transmit confidential named patient data by email with the exception of @hse.ie accounts or to the following addresses:
  Voluntary Hospitals:
  - AMNCH, Tallaght @amnch.ie
  - Beaumont Hospital @beaumont.ie
  - Cappagh National Orthopaedic Hospital @cappagh.ie
  - Coombe Women & Infants University Hospital @coombe.ie
  - Mater Public, Dublin @mater.ie
  - Marymount University Hospital and Hospice, Cork @marymount.ie
  - Mercy University Hospital, Cork @muh.ie
  - National Maternity Hospital, Holles Street, @nmh.ie
  - National Rehabilitation Hospital, @nrh.ie
  - Our Lady's Hospice, Harold's Cross, Dublin @olh.ie
  - Our Lady's Children's Hospital, Crumlin @olchc.ie and @olhsc.ie
  - Rotunda Maternity Hospital, Dublin @rotunda.ie
  - South Infirmary Victoria University Hospital, Cork @sivuh.ie
  - St. Francis Hospice, Dublin @sfh.ie
  - St. James's Hospital, Dublin @stjames.ie
  - St. John's Hospital, Limerick @stjohnshospital.ie
  - St. Luke's Hospital, Rathgar, Dublin @slh.ie
  - St. Vincent's Hospitals Group @st---vincents.ie, @svuh.ie, @stmichaels.ie, @svhg.ie
  - Temple Street Children's University Hospital @cuh.ie

  Private Hospitals And Clinics

- Aut Even Hospital, Kilkenny @auteven.ie
- Bon Secours Hospital, Tralee @bonsecours.ie
- St. Vincent's Private Hospital, Dublin @svph.ie
- Whitfield Clinic, Waterford @whitfieldclinic.ie

Agencies:

- Central Remedial Clinic (Dublin, Limerick & Waterford) @crc.ie
- Department of Health @health.gov.ie
- Health Products Regulatory Authority @hpra.ie
- Healthlink, National Messaging Broker @healthlink.ie, @healthlink.doh.ie
- SouthDoc @southdoc.ie
- Caredoc, caredoc@healthmail.ie
- NEDOC North East Doctor On Call nedoc@healthmail.ie
- National Cancer Registry Ireland ncri@healthmail.ie

If you have a query about any other location enquire at https://www.healthmail.ie/support.cfm

- All printed or written records with personal data should be shredded as soon as they are no longer needed.
- Each employee is personally responsible for the security and confidentiality of all types of paper and electronic information which they come in contact with during the course of their work.

Each member of staff with access to Laboratory Medicine results **MUST** adhere to the following HSE policy:

Information Security Policy and Information Technology Acceptable Usage Policy
http://hsenet.hse.ie/OoCIO/Service_Management/PoliciesProcedures/Policies/HSE_I_T_Security_Policy.pdf

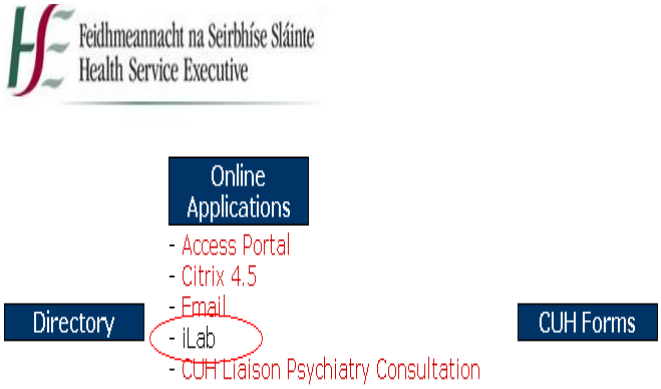
9.2 Confidentiality Undertaking for Staff having Access to, or Receiving, Laboratory Results

I understand that, in the course of my work, I may come into contact with, or have access to, confidential information relating either to individual patients, members of staff or to general public health issues. I understand that misuse of this information, especially its disclosure to people or agencies that are not specifically authorised to receive it would constitute a breach of confidentiality. I also understand that the use and securing of personal information is subject to the provisions of the Data Protection Act and that unauthorized disclosure of personal information is an offence under the act.

I confirm that I have read the above Laboratory Medicine guidelines on confidentiality and that I agree to comply with them as formally undertaken by signing the On-Line Laboratory Medicine Results and Confidentially Guidelines form.

9.3 Instructions i.Laboratory/Web Browser

Please note the icon for this application can be found on Staff Directory under Online applications, or by clicking on the following link
http://10.54.128.107/apex/mgwms32.dll?MGWLPN=APEX&APP=PCOMB&APPDIR=/APEX



1. Enter the Username and Password (if you have a problem logging on check if pop blocker is on).
2. Where prompted Patient Number enter C for Cork PIMS registered patients OR T for Tralee PIMS registered patients followed by the patients Medical Record Number
3. Under surname enter the first three letters of the patient's surname.
4. Then click the grey "NUMBER SEARCH" button on the right hand side of the screen.

   Note: If an MRN/RID is unavailable enter the patients Surname, Forename and DOB and click Search. Patients matching your search information will be returned select the patient required by clicking on the patient MRN/RID in the PATIENT RECORD NUMBER column
5. On selecting a patient the user can select specific discipline\specimen date or continue for most recent result.
6. All the lab results on the patient selected will be displayed. The most recently authorised report from the lab will appear at the top of the list. Select the specimen results you are looking for by clicking once on the appropriate date and time box in the Specimen Dare & Time column.
7. The results on the specimen selected will be displayed. Use the scroll bar on the right hand side of the screen to look for tests not displayed on the first screen. High or low results will be highlighted in a different colored box. Usually light blue for just outside the normal range and dark pink for well outside the range. Single or double arrows pointing up or down will also be displayed for results outside the reference range.
8. To review another specimen on that patient click once the <<Select Order Specimen button.
9. When Finished click the LOG-OFF button.
10. The i.Laboratory report font size can be enlarged on your pc screen hold Ctrl on the keyboard and rolling the mouse wheel up alternatively select Ctrl and +

How To Change the Lab Enquiry password (automatic account deactivation after three months if not updated

1. On iLaboratory log in screen click Change password button.
2. Enter your current username, current password and new password where prompted.

Note: The new password cannot be the same as the last and must contain at least five letters and one number.

3. Then click the Ok button. This new password takes immediate effect.
4. The password will be valid for three months and you will get a warning on screen every time you log on starting 20 days from the expiry date.
5. If you have any problems changing your password contact the Laboratory Information Systems Helpdesk by e-mail at CUHIT.Pathology@hse.ie on by phone on 021-4920150

9.4 iClinical Manager (iCM)

i.Clinical Manager (iCM) is the electronic patient record used in CUH. It provides order comms for Biochemistry, Auto Immune Serology, Haematology or Microbiology.

NB for full details on use of iCM please refer to the ICT User Manual

All iCM user data including how to apply for an account, logging onto iCM and searching for patient data can be found on Staff Directory under Guidelines→ iCM Users Guidelines or by clicking on the following link:
http://100.24.9.212/Menu_ApplicationForms/UserAccountRequestFormDoctors/UserGuides.asp

9.4.1 Logging on to iCM

1. Staff directory → Citrix→ National StorefrontPortal – enter your windows password → Hosted apps → ICM-SSWHG
2. This opens the iCM Log-On Screen Log into iCM please note the Username format is different from Citrix as it does not contain a dot between firstname and surname.e.g. If you log into Citrix as test.frank then your ICM log in will be testfrank.

9.4.2 Selecting a Patient

3. On logging into ICM the Patient List displays a list of current patients in a specified area.
4. The List Displayed is shown in the Current List dropdown box which can be changed by selecting a different dropdown option. To select a patient click on chosen patient so their details will display on the header.

9.4.3 Ordering of Laboratory Specimens on ICM

1. Obtain specimen from patient.
2. Select patient from appropriate list on ICM.
3. Go to Orders Tab.
4. Click Enter Order Icon on header or Enter Order button to open Order Browse.
5. Use Relevant Order Set or predictive text option at the 'Type to enter' field to find appropriate investigation and
6. Select or deselect components of Order Set as required.
7. Ensure Order is submitted on behalf of Consultant.
8. Add order.
9. To prioritise samples select URGENT REQUEST as the Collection Time
10. Amend clinical details (inadequate details can cause laboratory process delays)

11. Click OK.
12. Submit Orders Pending.

9.4.4 Collection of Specimen

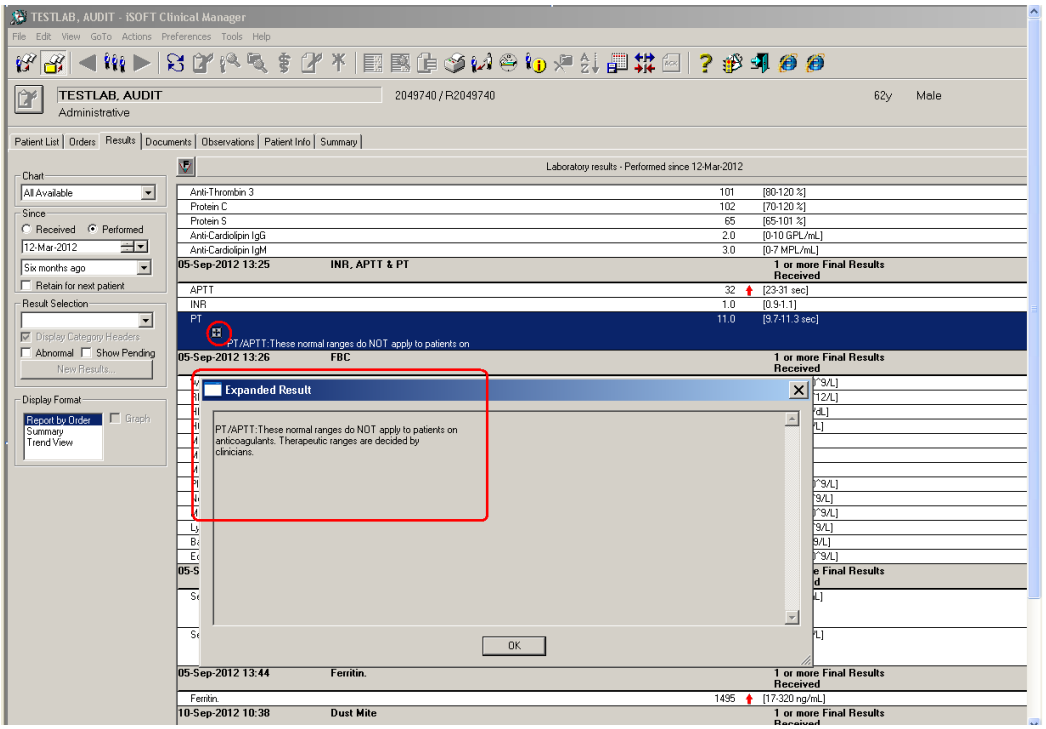
1. On Orders Screen - Add Specimen and select performing Department
2. Tick boxes to confirm investigations.
3. Amend number of labels if multiples required e.g. Blood Cultures
4. Click OK.
5. Ensure that labels printed match the details of patient identified for phlebotomy.
6. Ensure labels are affixed to correct bottles. Do not cover specimen blood volume or container 'fill to' marks.
7. Specimen Type on label should match Specimen Type on Bottle.
8. Bag Specimen

9.4.5 Results Viewing

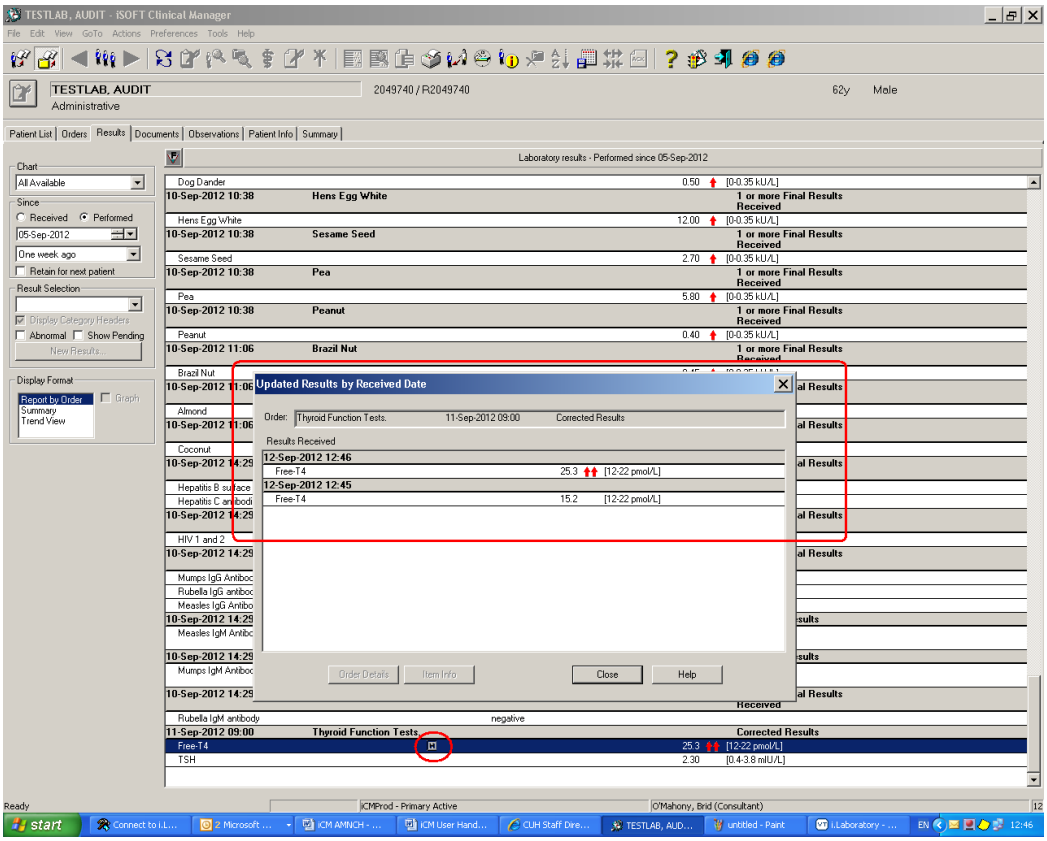
1. Results are available in iCM once all parts of the request profile are authorised by Lab
2. Click on the Results tab for a selected patient
3. Results outside of normal parameters are flagged with red arrows.

NB As Microbiology results and Positive/Negative text based abnormal results are not flagged

A ⊞ button in a result field indicates that there is an expanded result –right click to view entire comment



A H in a result filed indicates that a result has been modified - right click to view previous result



This view can be modified to select a specified date range or performing laboratory or test by selectively choosing options on the left hand sidebar

9.4.6 Contingency

Submitting Orders

Users should revert to manual contingency i.e. use paper forms for any requests submitted during downtimes (either iCM or Laboratory Information System {LIS})

Result Viewing

If iCM is down results will be available on iLaboratory

If LIS is down only results authorised prior to downtime will be available on iCM. Laboratories can be contacted for URGENT results.

Remember

Patient identity must be confirmed before phlebotomy

Samples must be labelled at all times

For training, fault logging, etc please contact the ICT Helpdesk on 28000 or email cuhit.helpdesk@hse.ie

9.5 Maternal & Newborn Clinical Management System (MN-CMS)

The MN-CMS Project is the design and implementation of an Electronic Health Record (EHR) for all women and babies in maternity services in Ireland. Cerner are the EHR provider chosen to deliver the system. The solution is called Cerner Millennium® and has been in use in CUMH since 2016. It provides order comms for Biochemistry, Auto Immune Serology, Haematology or Microbiology.

NB for full details on use of MN-CMS please refer to the MN-CMS Familiarisation Recordings available on CUH Staff Directory under Guidelines → Maternal Newborn Clinical Management System or by clicking the following link:
http://10.54.129.212/Menu_PolicyProcedure/MNCMS.asp

All MN-CMS user data including how to apply for an account, logging onto MN-CMS and searching for patient data can be found on Staff Directory under Guidelines→ Maternal Newborn Clinical Management System or by clicking on the following link:
http://10.54.129.212/Menu_PolicyProcedure/PDFs/MNCMS/MN-CMS%20Information%20Governance%20and%20Security%20Leaflet_August%202016.pdf

9.5.1 Logging on to MN-CMS

1. Staff directory → Citrix→ National StorefrontPortal – enter your windows password → Hosted apps → Powerchart
2. This opens the Cerner Millenium Log-On Screen. Log into MN-CMS please note the Username format is different from Citrix as it does not contain a dot between firstname and surname.e.g. If you log into Citrix as test.frank then your MN-CMS log in will be testfrank.

9.5.2 Selecting a Patient

1. On logging into MN-CMS the Maternity Whiteboard displays a list of current patients in a specified area.
2. To select a patient click on chosen patient so their details will display on the header and their chart opens on the default screen of **Maternity View.**
3. Alternatively, search for the patient using the MRN or surname using the appropriate dropdown in top right hand corner search field.

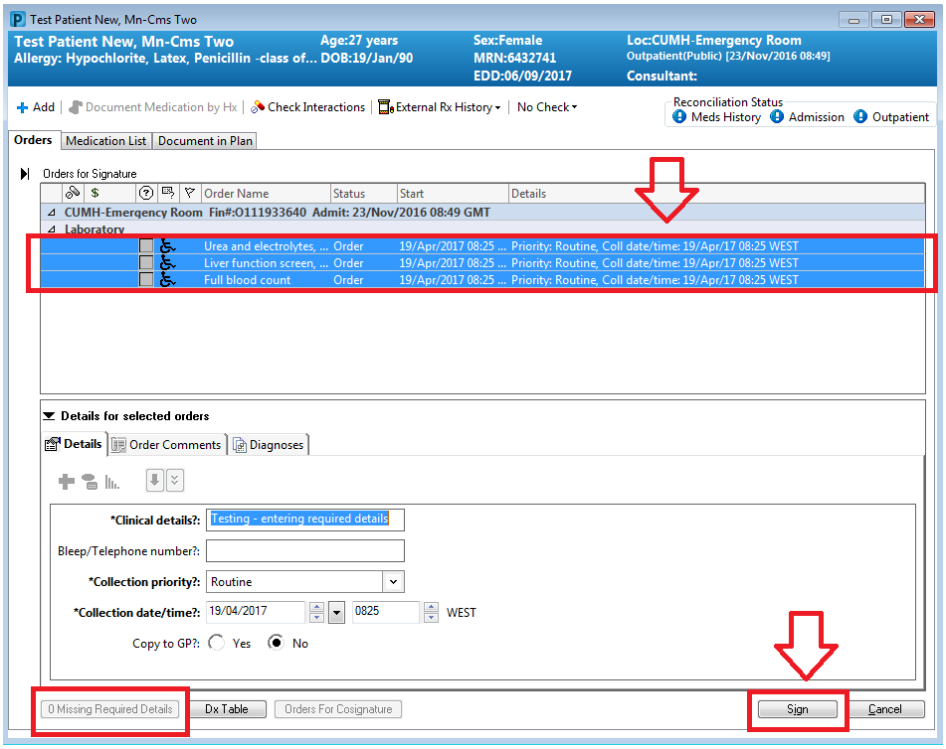
9.5.3 Ordering of Laboratory Specimens on MN-CMS

Ordering laboratory tests on a patient can be carried out by one of two ways:

(a) USING QUICK REQUESTS

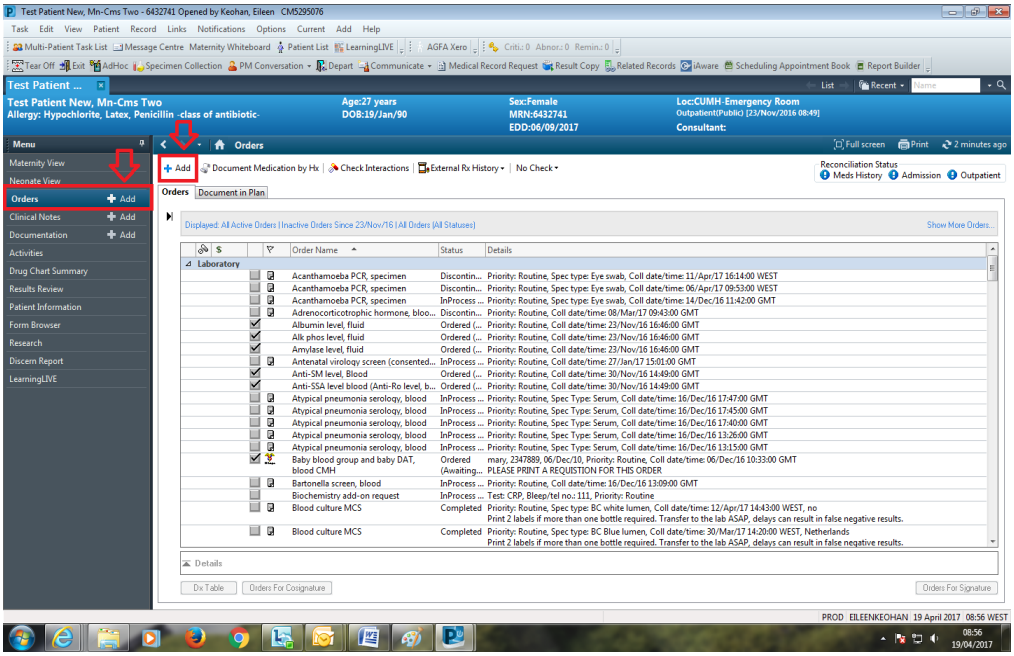
13. Obtain specimen from patient.
14. On the Maternity View screen, select the Quick Requests option, which opens a new screen.
15. Select the required order under Lab Order Selection
16. Multiple orders can be selected by clicking on them which highlights the required orders.
17. These orders then have to be signed to place the order successfully, select the green Orders for Signature option
18. Click on the Sign option
19. An Ordering Clinician window pops up, enter Clinician Surname and search, then select the appropriate option.
20. The Order Date/Time and the Communication type default.
21. Click OK
22. The selected orders appear in a new window. Before you can Sign the order, the required missing details need to be entered.
23. Click on the Missing Required Details on the bottom left hand side of the window, to display any further required information to be entered.

24. Enter the details required in the fields seen. Mandatory fields appear in yellow and occasionally in white. An order cannot be signed until all the mandatory fields have been completed
25. Click on the Sign option below, which then closes this window.

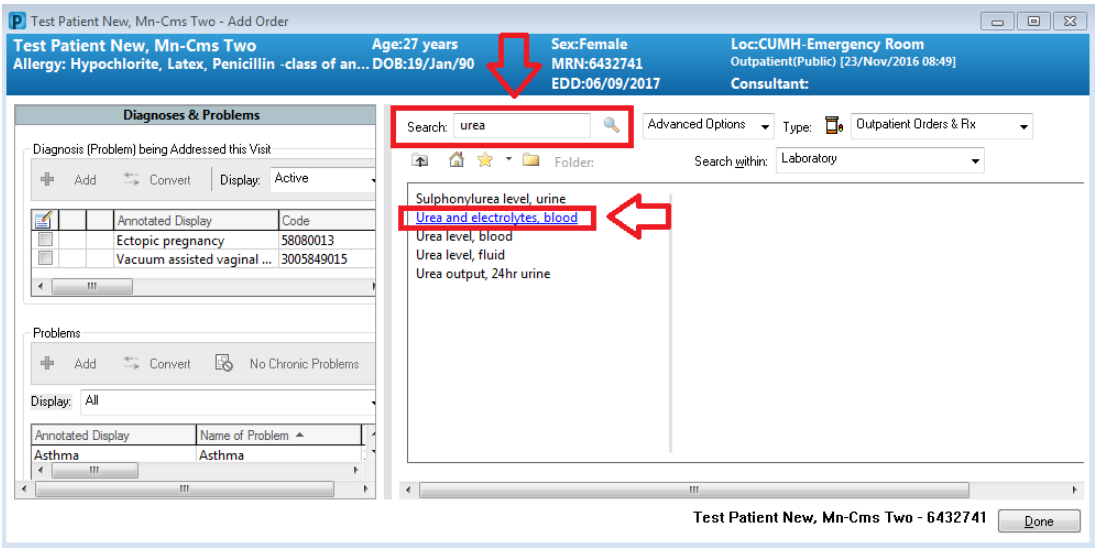


Using the Orders Tab

1. From the options listed on the left hand side of the patients' chart, click on the + Add on the Orders tab or alternatively, click the Orders tab and then click the + Add option on the orders window which opens



2. A new window opens, to narrow down the search area, firstly use the drop down option for the Search within field and select Laboratory, then enter the required order in the Search field

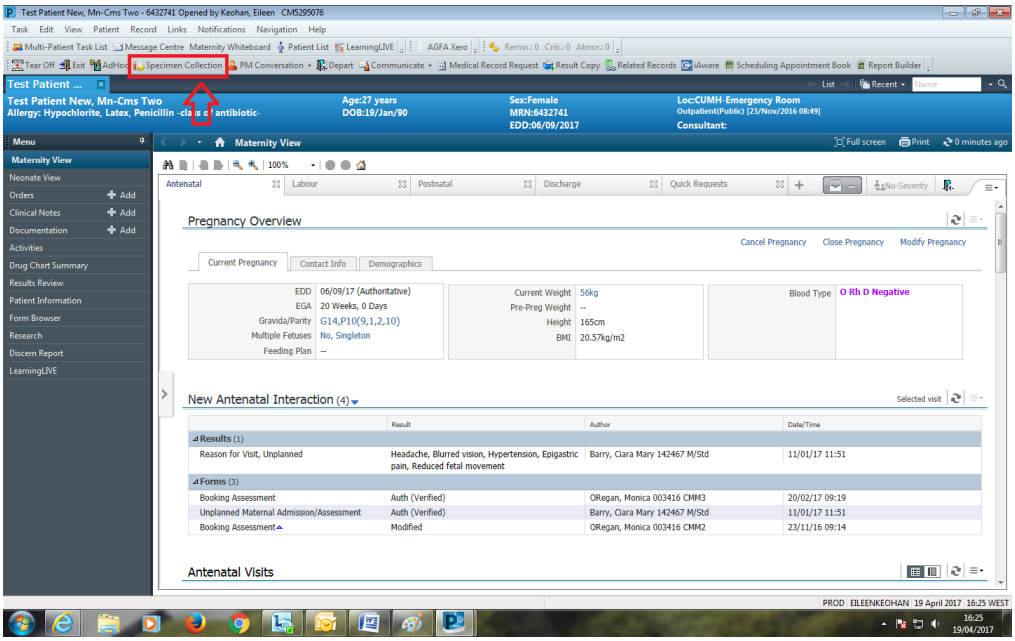


3. Find the required order and click on it
4. An Ordering Clinician window pops up, enter Clinician Surname and search, n select the appropriate option.
5. The Order Date/Time and the Communication type default - Click OK
6. Click Done or X out of the window if all required orders are already placed
7. Fill in the required details for the order, the mandatory fields in this case appear in yellow. Enter the information and click Sign

9.5.4 Collection of Specimen

Any orders made can be collected using the Specimen Collection option from the tabs across the top of the patients' chart.

1. Click the Specimen Collection tab



2. Scan the patient's barcode
3. A window opens showing all orders made but pending collection.
4. For each of the orders, hover the mouse to the far right hand side and left click, then click on Collected from the options
5. At this stage, specimen barcodes can be printed for the orders.
6. Click on the Print option, followed by Print Label. The name of the printer you are printing the barcodes to needs to be known.
7. After clicking Collected for an order, the coloured box (on the left hand side of this window), – indicating the colour of the sample tube required for that particular test, changes to a tick mark – indicating the order has been successfully collected.
8. Once all orders have been signed, the window updates with the message Patient has no specimen orders for collection. Click the Close option

9.5.5 Results Viewing

1. Results are available in MN-CMS once all parts of the request profile are authorised by Lab
2. Click on the **Results Review** option on the left hand side of the patients' chart.
3. Laboratory can be selected from the tab on this window to show only the relevant information from a laboratory perspective.
4. The results displaying are those within the timeframe shown across the top of this window. The arrows to the far left and far right of this window can be used to change the timeframe of viewable results.
5. Double click on a result to view additional information, such as the Laboratory Accession Number under the Result tab; the Source Type under the Specimen tab; specimen comments under the Comments tab; and an audit trail under the Action List tab.

9.5.6 Contingency

Submitting Orders:

Users should revert to manual contingency i.e. use paper forms for any requests submitted during downtimes (either MN-CMS or Laboratory Information System {LIS})
Result Viewing:
If MN-CMS is down results will be available on iLaboratory
If LIS is down only results authorised prior to downtime will be available on MN-CMS.
Laboratories can be contacted for URGENT results.

Remember
Patient identity must be confirmed before phlebotomy
Samples must be labelled at all times

9.6 Instructions for collecting Blood Components via Blood Track Enquiry

- On the designated ward PCs double click on the Blood Track Manager Icon

- Select PATIENT LOOKUP
- Enter patient's MRN number in appropriate field
- In PRODUCT GROUP use the drop down box to select the component to be collected
- Enter SEARCH
- After 10-20 seconds the number of the desired units will appear on screen
- (If nothing appears on the screen please contact the Blood Transfusion Laboratory)
- Click on the number displayed and select PICK UP SLIP
- At the prompt NUMBER OF UNITS enter 1.followed by enter
- Once printed instruct the porter to collect the blood component from the laboratory

10 ON CALL (EMERGENCY SERVICE)

The on-call service is restricted to true emergencies. The turn-around time will be adversely affected if excessive demands are made on the service.

Tests Available On-Call

Test	Laboratory	Unrestricted	Restricted Requiring Consultation
Alanine amino Transferase	Biochemistry	✓	
Albumin	Biochemistry	✓	
Alkaline phosphatase	Biochemistry	✓	
Ammonia	Biochemistry	✓	
Amylase	Biochemistry	✓	
Antibiotic Assays	Microbiology	✓	
Antibody Screen	Blood Transfusion	✓	
APTT	Haematology	✓	
Aspartate amino Transferase (AST)	Biochemistry	✓	
Blood Cultures	Microbiology	✓	
Blood gases	Biochemistry	✓	
B-HCG (Blood)[1]	Biochemistry	✓	
Calcium	Biochemistry	✓	
Carbamazapine (Tegretol)[2]	Biochemistry		✓
Carboxyhaemoglobin	Biochemistry	✓	
Chloride	Biochemistry	✓	
Cold Agglutinins	Blood Transfusion		✓
CAPD Fluid	Microbiology	✓	
Creatine kinase (CK)	Biochemistry	✓	
Creatinine	Biochemistry	✓	
C R P (C-Reactive Protein)	Biochemistry	✓	
CSF Microscopy and Culture	Microbiology	✓	
CSF Protein and Glucose	Biochemistry	✓	
Digoxin[2]	Biochemistry		✓
Direct Bilirubin	Biochemistry	✓	
Direct Coombs Test	Blood Transfusion	✓	
ESR	Haematology	✓	
Ethanol[2]	Biochemistry		✓
Epanutin (Phenytoin)[2]	Biochemistry		✓
Epilim (Sodium Valproate)[2]	Biochemistry		✓
Gamma GT (GGT)	Biochemistry	✓	
Fibrinogen	Haematology	✓	
Full Blood Count (FBC)	Haematology	✓	
Glucose	Biochemistry	✓	
Group and Coombs	Blood Transfusion		✓
Group and Crossmatch[3]	Blood Transfusion	✓	
Group and Hold	Blood Transfusion	✓	
HIV Ag/Ab, HBsAg, HCV antibody (Needlestick Injury - Source)	Microbiology	✓	
INR	Haematology	✓	
Influenza [8]	Microbiology		✓
Iron[2]	Biochemistry		✓
Kleihauer testing	Haematology		✓
Lactate	Biochemistry	✓	
Lactate Dehydrogenase (LDH)	Biochemistry	✓	
Lithium[2]	Biochemistry		✓
Magnesium	Biochemistry	✓	
Malaria Screen	Haematology	✓	
Methaemoglobin	Biochemistry	✓	
Microbiology – urgent samples[4]	Microbiology	✓	
Osmolality	Biochemistry	✓	

Test	**Laboratory**	Unrestricted	Restricted Requiring Consultation
Paracetamol	Biochemistry	✓	
Phenotyping Red Cell Antigens	Blood Transfusion	✓	
Phosphate	Biochemistry	✓	
Pregnancy Test	Haematology	✓	
Potassium	Biochemistry	✓	
Prolactin[5]	Biochemistry		✓
Protein – Total	Biochemistry	✓	
Reticulocytes	Haematology	✓	
Salicylate	Biochemistry	✓	
SARS CoV 2[9]	Microbiology		✓
Sickle Cell Screen	Haematology	✓	
Sodium	Biochemistry	✓	
Theophylline[2]	Biochemistry		✓
Total bilirubin	Biochemistry	✓	
Transfusion Reaction Investigation	Blood Transfusion	✓	
Troponin I[6]	Biochemistry	✓	
Urate	Biochemistry	✓	
Urea	Biochemistry	✓	
Urinary creatinine	Biochemistry	✓	
Urinary electrolytes	Biochemistry	✓	
Urinary urea	Biochemistry	✓	
Urinary Osmolality	Biochemistry	✓	
Urine Microscopy & Culture (urgent e.g. A/E)	Microbiology	✓	

Notes:

1. Urgent Beta HCG requests only will be processed.
2. Currently analysis of these drugs (TDM) is only available in an 'over-dose' situation. Routine monitoring of the anti-epileptic drugs, digoxin and theophylline on Saturday and Sunday mornings.
3. Blood is crossmatched only for Emergency purposes. Requests for blood for planned transfusion will generally not be crossmatched during emergency "On Call" hours and will be processed on the next routine working day.
4. Sterile body fluids marked "special attention" or "emergency". Sputa and swabs (excluding MRSA screens and HVS) marked "special attention" or "emergency" daily up to 8pm.
5. Prolactin requests will be processed only to exclude a prolactin-secreting tumour when emergency surgery is contemplated.
6. Troponin I requests which fulfil the agreed criteria.
7. All Coagulation Factor assays must be requested by prior approval by Consultant Haematologist On-Call.
8. Emergency Influenza testing provided up to 23:00 hrs during influenza season
9. SARS CoV 2 – routine service available up to 16:00 hrs week days, Urgent requests may be facilitated through the ward on the LIAT Point of care system in ED

11 BLOOD TRANSFUSION

Laboratory Profile:

The Blood Transfusion Laboratory at CUH provides testing and advice to users in relation to general transfusion issues including antenatal blood group serology. Since September 2008, it operates a quality management system to ISO15189 & AML–BB standards and since then time has been accredited by the Irish National Accreditation Board (INAB) - reference 199MT (details available from www.inab.ie).

The laboratory continues to actively engage in the accreditation process to ensure compliance with the EU Blood Directive 2002/98/EC and other relevant legislation and works closely with Haemovigilance personnel to ensure all aspects of best transfusion practice, Haemovigilance and Traceability requirements are maintained.

In 2023:

- Approx. 22,000 blood group and antibody screen investigations were performed in the crossmatch section of the laboratory.
- Appox 10,000 blood group and antibody screen investigations were performed in the antenatal section of the laboratory.
- Approx 1,700 infant blood group and DCT specimens were processed
- Approx 1,300 cffDNA Screening requests were referred
- Approx 350 HLA B27 Investigations were performed
- Approx 8,000 units of red cells were transfused.
- Approx 1,500 units of plasma were transfused.
- Approx 2,000 units of platelets were transfused.
- Approx 800 gms Fibrinogen concentrate were transfused
- Approx 1,500 vials of Anti-D Ig were transfused

The laboratory also plays an important role in the care and management of antenatal patients and those patients who may require transfusions with various blood components or products while in hospital.

Hospital Transfusion Committee:

A Hospital Transfusion Committee exists within CUH and is co-ordinated by blood transfusion laboratory personnel. This committee meets at least 4 times per year and its remit is to promote the highest standard of transfusion practice through peer review and advocate a high standard of care in Cork University Hospital (CUH) and Cork University Maternity Hospital (CUMH) for patients at risk of transfusion (i.e. those who must be transfused, and also those who, with good clinical management, may avoid the need for transfusion). The committee also monitors that the conditions and requirements of the EU Blood Directive 2002/98/EC including articles 14 and 15 in relation to Traceability and Haemovigilance are implemented at CUH and CUMH.

Representatives of users of the blood transfusion laboratory service are essential and welcome on the committee. It provides a forum for information exchange and is chaired by a consultant haematologist (see list above).

Tests available:

The following table outlines the tests available from the Blood Transfusion Laboratory, CUH.

Details of tests are contained in the A to Z section of this Handbook.

INAB Accredited Tests Available	Non INAB accredited Tests Available
Antenatal Serology (Blood Group + Antibody Screen +/- Antibody Identification)	Antibody Titration
Blood Group and Coombs	Anti-c Quantitation
Blood Group and Crossmatch	Anti-D Quantitation
Blood Group and Hold	Anti-Platelet Antibody Investigation
Blood Transfusion Reaction Investigation (Blood Group + Antibody Screen +/- Antibody Identification + Crossmatch +/- Red Cell Phenotyping)	Cold Agglutinins
Direct Coombs Test	Foetal Genotype
Phenotyping Red Cell Antigens	Haemolysin Test
HLA B27 Typing	HLA Antibody (Antibody to Human Leucocyte Antigen)
	HLA Typing
	HPA (Human Platelet Antigen + Antibody Investigation for NAITP)
	Leucocyte (White Cell) Antibody Investigation
	Platelet Antibody Investigation
	Cytotoxic Antibodies
	Foetal DNA testing (for Rh typing).

Sample bottles & Request Forms

Sample bottles and request forms may be obtained from CUH Stores.

It is very important that sample tubes used are within their expiry date.

Please note that expired sample bottles may be rejected and repeat samples requested

On-call services:

The routine day in the blood transfusion laboratory 08:00-20:00 Monday-Friday and 09:00-12:30 Saturday
Outside of these hours the transfusion operates an on-call schedule whereby only emergency samples are processed during on-call hours.

The on-call service is provided by a single staff member and is contactable by the bleep system #199.

The list of tests available during out-of-hours on-call times are listed in this handbook with specific notes as appropriate.
Samples for elective procedures should be brought directly to the laboratory before 5 p.m. on the day prior to surgery.

It cannot be guaranteed that blood will be ready for elective surgery the following morning if samples arrive in the laboratory after this time.

Consent:

Upon admission to the CUH, it is understood that consent is given by the patient by way of signature for any treatment deemed necessary by medical personnel that includes transfusion of blood and/or blood products.

Consent is required for HLA B27 typing (see section 12 TEST DIRECTORY for further details)

Turnaround time: Turnaround time (TAT) is defined as the time from receipt of specimen in the laboratory until the result (and/or blood is issued) is reported either in the computer or by phone. The Blood Transfusion Laboratory will attempt to meet the turnaround times outlined in the test directory A to Z section of this handbook, subject to the availability of sufficient resources.

- The laboratory operates a "zero-tolerance policy" in relation to sample labelling which is in line with internationally recognised BSH Guidelines. Inadequately labelled samples must be resampled.
- The presence of antibodies may lead to delays in the provision of blood in both emergency and non-emergency situations. It is therefore essential that samples for routine elective surgeries be sent to the laboratory to arrive no later than 5 p.m. on the previous working day to ensure blood will be ready.
- On occasion, the laboratory may request additional or repeat samples. This may be due to the investigation of unusual results, poor sample quality (e.g. haemolysis, labelling errors) or patients requiring several crossmatches etc.

Laboratory Requests:

Important considerations for blood transfusion laboratory requests:

Blood transfusion samples are only valid for 72 hours.

For **urgent requests**, the requestor must contact the blood transfusion laboratory by phone (routine hours) or bleep (on call hours)

From the patient perspective, there are no specific requirements in terms of fasting etc. with regard to preparation prior to sample collection.

The volume of blood sample required for blood transfusion testing should be sufficient to meet the needs of testing procedures requested. The volumes required are outlined in A to Z section.

Sampling & Labelling of Blood Transfusion Samples

Blood transfusion samples may only be taken by Doctors or specially trained Nurses/Midwives and phlebotomists at CUH/CUMH.

Request forms and samples for blood transfusion laboratory requests from all users of the service MUST be

- handwritten or
- labelled with a BloodTrack personal digital assistant (PDA) label or
- labelled using the MN_CMS system (CUMH)

- The **BloodTrack PDAs** are an IT based solution intended to prevent sample labelling errors. The PDAs work by scanning a barcode on the user's ID badge and then scanning a barcode on the patient's wristband, which encodes the patient's demographics (forename,

surname, date of birth & medical record number). The user's details and patient's demographics are then printed on a label, which can be attached to the blood transfusion sample & Request Form. For access to Blood Track contact Haemovigilance personnel in the Blood Transfusion Department to arrange training.

- The CUMH uses the **MN_CMS (Maternity Newborn Clinical Management System) Millennium Electronic record**. Transfusion sample labels & Request Forms generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department.

Essential information required on both samples and Request Forms MUST include:

- Patient's Forename
- Patient's Surname
- MRN (in case of GP samples where no MRN available the address is to be used)
- Date of Birth
- Identity of person taking the sample (Doctor/dedicated nurse) including bleep/contact number. Ideally, Doctors should include their MCRN, Nurses/Midwives should include An Bord Altranais PIN.
- Date and time that the sample was taken.
- Special requirements if indicated (e.g. CMV Neg / Irradiated) – on request form.

Adequate completion of requests SHOULD include clinical information so that work may be prioritised and processed accordingly in the laboratory (e.g. obstetric history, transfusion history, reason for transfusion etc.).

Oral (e.g. verbally by telephone) "Add-On" requests can be facilitated by the laboratory when appropriate. These requests must be accompanied with a completed written Blood Product Requisistion Form LF-C-BTR-PROREQ.

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

Unconscious patients admitted to the emergency department should be identified using the system as agreed with the blood transfusion laboratory, CUH as detailed in local instructions (Please be familiar with current instructions in the emergency department).

In the event of a major incident when many patients may be admitted at the same time, the labelling protocols should be used as described in the local major incident policies available in the Emergency Department. Refer to PPG-CUH-CUH-215 for additional information.

The laboratory shall identify potential risks to patient care in the pre-examination, examination and post-examination processes. These risks

	shall be assessed and mitigated to the extent possible. The residual risk shall be communicated to users as appropriate.
Prescibing	PPG-CUH-CUH-80 described the steps to be taken when prescribing a blood component including: • Type of component • Special requirements • TACO Risk Assessment • No. of Blood Components required • Prophylactic drug therapy if indicated • Rate/Duration of transfusion • Provision of patient information leaflet. • Prescriber's details
Transport of Blood Transfusion Samples	Samples should be transported to the laboratory using the guidelines described in this document. All inpatient samples should be brought directly into the laboratory and not left at Laboratory Reception. Urgent samples sent using the pneumatic chute system must be accompanied with a telephone call or bleep to alert Laboratory personnel. Samples should arrive in the laboratory no later than 48 hrs after sampling. Materials used in the collection of primary samples should be disposed of in accordance with local health and safety guidelines. The laboratory shall establish and periodically evaluate adequacy of sample transportation systems.

Storage, Ordering and Collection of Red Cell Concentrates	Red cell concentrates are stored from 2-6°C in temperature-controlled and monitored fridges, which can only be accessed by trained authorised personnel. Additional red cell concentrates are ordered by contacting the CUH Blood Transfusion Laboratory (phone or bleep) and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-PROREQ) to the laboratory. Addressograph labels may be used on this form however; the requestor MUST sign this form. It is important to note that the sample used for that crossmatch is only valid for 72 hours from the time of sampling after which time a new sample is required. For urgent requests, once labelled and prepared, the laboratory will contact the requesting location when the red cell concentrates are ready for collection

	Prior to the collection of red cell concentrate for transfusion from the blood transfusion laboratory, it is recommended that the clinical area review the most recent haemoglobin result. Ward staff generate a collection slip either: • electronically through the Blood Track Enquiry Function (CUH) or the MN_CMs system (CUMH) (these electronic collection slips print in the laboratory for the porter to access) OR • they complete a manual collection slip (handed directly to porter) Red cells should transfused within 4 hours of 'spiking' the pack and/or 4 ½ hours of removal from the blood fridge/igloo, whichever is sooner. They should be returned to the laboratory if the transfusion is unduly delayed. For further details on the collection process and administration of red cell concentrates refer to procedure PPG-CUH-CUH-13
Storage, Ordering and Collection of Platelets:	Platelets are stored from 20-24°C on in temperature-controlled and monitored platelet agitator in the blood transfusion laboratory which can only be accessed by trained authorised personnel. Platelet components are ordered by contacting the CUH Blood Transfusion Laboratory (phone or bleep) and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-PROREQ) to the laboratory. Addressograph labels may be used on this form however; the requestor MUST sign this form. Laboratory personnel may have to request a sample for blood grouping if no record of blood group is available in the laboratory. Laboratory personnel will arrange the delivery of platelets from IBTS. It may not always be possible to have ABO compatible platelets available from IBTS, so laboratory personnel may need to confirm suitability with requesting clinician. For urgent requests, once labelled and prepared, the laboratory will contact the requesting location when the platelets are ready for collection Platelets should not be stored at ward level and should be returned to the laboratory immediately if not being used immediately. For further details on the collection process and administration of platelet components refer to procedure PPG-CUH-CUH-13

Storage, Ordering and Collection of plasma (*i.e. LG-Octaplas*),	Plasma is stored at less than -18°C in temperature-controlled and monitored freezers, which can only be accessed by trained authorised personnel. Plasma areordered by contacting the CUH Blood Transfusion Laboratory (phone or bleep) and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-PROREQ) to the laboratory. Addressograph labels may be used on this form however; the requestor MUST sign this form.

	Plasma products are thawed in the laboratory upon request and requires 30-45 minutes to be prepared depending on the number of units required. For urgent requests, once labelled and prepared, the laboratory will contact the requesting location that the plasma is ready. Once thawed, they are stored at 2-8°C in the laboratory and once collected it is recommended that they are used within 8 hours from thawing. If the product is not being transfused the product should be returned to the laboratory immediately. For further details on the collection process and administration of plasma components refer to procedure PPG-CUH-CUH-13 Plasma is NOT routinely necessary in the management of over-anticoagulation with warfarin and the National Haemovigilance Office has issued the following guidelines:

Coagulation Status of Patient	Corrective Action
INR result between 3.0-6.0 (target 2.5) INR result between 4.0-6.0 (target 3.5)	1. Reduce warfarin dose or stop. 2. Restart warfarin when INR <5.0
INR result between 6.0-8.0 with no bleeding or minor bleeding.	1. Stop Warfarin 2. Restart warfarin when INR <5.0
INR result >8.0 with no bleeding or minor bleeding	1. Stop warfarin 2. Restart warfarin when INR <5.0 3. If other risk factors for bleeding exist, give 0.5-2.5 mg of oral or I.V. Vitamin K.
Life-threatening bleed	1. Stop warfarin 2. Give Prothrombin complex concentrate (e.g Octaplex) (50IU/kg) or Plasma (15 mL/kg) 3. Give 5mg of oral or I.V. Vitamin K

Note: *The maximum recommended Prothrombin Complex Concentrate dose is 3000 IU*

Storage, Ordering and Collection of other blood products e.g. Prothrombin Complex Concentrate (*i.e.* Octaplex), Albumin, Fibrinogen Concentrate, Clotting Factor Concentrates, etc.	All blood products issued by the blood transfusion laboratory are stored according to manufacture instructions at either room temperature (monitored) in the laboratory or at 2-8°C in temperature controlled and monitored fridges, which can only be accessed by trained authorised personnel. Products are ordered by contacting the CUH Blood Transfusion Laboratory (phone or bleep) and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-PROREQ) to the laboratory. Addressograph labels may be used on this form however; the requestor MUST sign this form. The blood transfusion laboratory holds a minimum stock level of all blood products supplied by the laboratory. Should the requestor have a requirement for a substantial quantity of any particular product, the requestor where possible should contact the laboratory so that additional product may be ordered. For urgent requests, once labelled and prepared, the laboratory will contact the requesting location that the blood product is ready for collection. All blood products should be transfused a soon as possible on arrival on the ward and if there is any undue delay in the commencement of the transfusion, the blood product should be returned to the laboratory For further details on the collection process and administration of blood products refer to procedure PPG-CUH-CUH-13

Storage, Ordering and Collection of Anti-D Immunoglobulin	Anti-D Immunoglobulin is stored from 2-6°C in temperature-controlled and monitored fridges, which can only be accessed by trained authorised personnel. Anti-D Immunoglobulin are ordered by contacting the CUH Blood Transfusion Laboratory (phone or bleep) and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-ANTID) to the laboratory. Anti-D Immunoglobulin is primarily transfused in the CUMH and the Blood Product Requisition Form can be generated electronically through the MN_CMS system (See note below) For urgent requests, once labelled and prepared, the laboratory will contact the requesting location that the anti-D immunoglobulin is ready. Anti D immunoglobulin should be transfused a soon as possible on arrival on the ward and if there is any undue delay in the commencement of the transfusion, the blood product should be returned to the laboratory For further details on the collection process and administration of blood products refer to procedure PPG-CUH-CUH-13 and PPG-CUH-MAT-5

Note: For all blood component and blood products requests from the CUMH, the MN_CMS system allows the user to generate an electronic Blood Product Requisition Form.

The CUMH user must still contact the CUH Blood Transfusion Laboratory (phone or bleep) and send either the electronic or manual Blood Product Requisition Form to the laboratory

Storage of samples in the Blood Transfusion Laboratory:	Blood transfusion samples are stored for 72 hours in controlled monitored storage 2-8°C. After this time, samples are disposed in accordance with local policies.
Emergency Blood Requests Pre-Hospital Transfusion:	A limited number of O Rh(D) Negative Blood are available for EXTREME emergency situations. These units are stored in selected locations which include the blood transfusion laboratory issue fridge and the theatre reception fridge. The laboratory must be informed if these units are used and the accompanying form must be fully completed and returned to the laboratory. For further information refer to procedure PPG-CUH-CUH-210 The Blood Transfusion laboratory in conjunction with the CUH Emergency Department run a successful pre-hospital blood transfusion project whereby blood is taken from the transfusion laboratory to the scene of an incident and may be transfused at the scene. For further information refer to procedure PPG-CUH-CUH-282 This entire transfusion chain is governed by the laboratory's quality management system to the ISO15189 standards and is fully compliant with the EU Blood Directive 2002/98/EC and other relevant legislation in terms of best transfusion practice, Haemovigilance and Traceability.
Massive Transfusion Protocol in CUH/CUMH	The Massive Transfusion Protocol (MTP) should only be initiated by a Senior Clinician (Registrar or above) and ordered based on the patient's clinical symptoms and actual blood or anticipated blood loss. Clear lines of communication between the Clinical area and Blood Transfusion personnel is a key aspect in the management of Massive Haemorrhage. Guidelines for Clinical User • Notify BT laboratory to "Activate MTP for patient XXX". "Code Red" can also be used. • Ensure a correctly labelled Group and Crossmatch sample is sent without delay to the BT lab • A senior clinician determines that patient meets criteria for MTP • Baseline blood tests (FBC, Coagulation, Fibrinogen, U&E, LFT, Blood Gases) should be carried out and repeated every 15 minutes during MTP • The first Massive Haemorrhage Pack (MHP) is prepared by BT staff and include the following: • 4 x RCC (may be group O RhD Negative or Group Compatible depending on availability of sample and urgency) • 4 x SD Plasma (may be group AB or Group Compatible depending on availability of sample and urgency)

	• 1 x Platelet (may be group A RhD Negative, Group Compatible, or alternative blood group depending on availability and urgency) • Note: For Obstetric Haemorrhage early transfusion with Fibrinogen Concentrate (4g available in CUMH theatre) is recommended. • If massive bleeding continues after transfusion of the first pack the clinical area should request pack 2 of the MTP. • This Pack is identical to the contents of pack 1 except for the addition of 4g of Fibrinogen Concentrate. • Continue to order additional packs if bleeding is uncontrolled and consider Haematology Medical team consultation. • Inform BT lab to "Step Down" when / if bleeding is controlled • Following step down review documentation to ensure pink traceability stickers from all transfused blood products have been placed in the patient's blood kardex.
Managing Transfusion Reactions in CUH/CUMH	If a patient develops signs and symptoms of acute transfusion reaction (ATR) either during or soon after transfusion of a blood component refer to the Transfusion Reaction Management & Investigation Algorithm on P14 of the Blood Transfusion Kardex (Form No 15a, FOR-CUH-CUH-7). In all cases where a patient has a suspected transfusion reaction, contact BT and/or Haemovigilance personnel and document the details of the reaction in the patient's medical and nursing notes.
Blood transferred with a patient from an external location:	Any blood transferred to the CUH/CUMH with a patient from an external source (e.g. another hospital) should be brought directly to the blood transfusion laboratory. It is essential that any documentation accompanying the blood is completed accordingly and given to the transfusion laboratory personnel. It is imperative that the storage conditions of blood 'in transit' are controlled. It is also necessary to obtain a fresh group and hold sample as soon as possible from such patients so that should additional blood be required, it can be used for crossmatching in the CUH blood transfusion laboratory.
General Haemovigilance:	Haemovigilance may be defined as: "a set of surveillance procedures, from the collection of blood and its components, to the follow up of recipients to collect and assess information on unexpected or undesirable effects resulting from the therapeutic use of labile blood products, and to prevent their occurrence or recurrence" (National Haemovigilance Office, 2004.) Since 2005 the role of the Haemovigilance staff has been greatly influenced by the transposition into Irish law of the EU Blood Directive 2002/98/EC. The directive became law in Ireland on the 8th February 2005 and has implications for all hospital blood banks. Eight articles apply directly to all staff involved in the transfusion process throughout the hospital. The major implications involve the implementation of quality systems for all aspects of transfusion, the total traceability of every blood product, the training of personnel involved in the transfusion process and the reporting of any

	serious adverse reactions or events associated with the transfusion of blood components. Compliance with this legislation is policed by the Health Products Regulatory Authority (HPRA, formerly known as the Irish Medicines Board) under the HPRA Act 1995 and in the event of directive non-compliance; the HPRA has censure authority up to and including the closure of a facility The remit of the haemovigilance personnel includes the following: • Promotion of safe and effective transfusion practice for those receiving blood components/products. • Participation in local working groups and on a national basis to promote the safe and effective transfusion practice for those receiving blood components/products. • Provision of educational programmes for staff involved in the transfusion process • Participation in and development of audit initiatives as appropriate. • Development and maintenance of effective channels of communication by encouraging networking, support and cross-clinical group working. • Contribution to the shaping of policy relating to transfusion of blood components by responding to local and national developments • Investigation of any serious adverse reactions or events associated with the transfusion of blood components. • Maintenance of blood component traceability.
Haemovigilance Training and Policies	Haemovigilance personnel have put policies and procedures in place via the Q-Pulse document management system in CUH promoting good transfusion practice in clinical areas. Scheduled Haemovigilance education sessions are provided by Haemovigilance personnel to all clinical staff. Clinical staff who are unable to attend these scheduled training sessions should make contact with the CUH/CUMH haemovigilance personnel to arrange training. It is CUH policy that all clinicians should have completed both (*Safe Transfusion Practice (Formerly Module 1*) and *Blood Components and Indications for Use (Formerly Module 2*) of the SNBTS LearnPro e-learning program. (*www.learnbloodtransfusion.org.uk/*). Instructions on how to access the Q-Pulse system and the SNBTSe-learning program are available from haemovigilance staff. All hospitals have a legal requirement to trace each individual blood component, whether transfused or disposed of, in accordance with the EU Blood Directive (2002/98/EC). This information must be held and available for thirty years. Therefore, full and clear documentation associated with transfusion is essential. All serious adverse reactions and events associated with the transfusion of blood components are investigated documented and, where required, reported to the National Haemovigilance Office (NHO) through a confidential anonymous reporting system. If you suspect a transfusion reaction, you must contact the Blood Transfusion Laboratory or Haemovigilance personnel as identified in this Handbook. There is a Policy dealing with the recognition, investigation and management of a Suspected Transfusion Reaction on Q-Pulse. (PPG-CUH-CUH-30).

	The decision to transfuse is the responsibility of the prescribing clinician and should be based on the best available evidence. The prescribing clinician should discuss the transfusion with the patient in accordance with hospital policy (PPG-CUH-CUH-80), document this discussion in the patient's medical notes and should give the patient the 'Having a Blood Transfusion – Information Leaflet for Patients and Guardians' (INF-CUH-CUH-9). The information leaflets are available from the Stationary Stores Department. Where clinically possible it is recommended that blood transfusions should only be given during routine working hours. There is a policy available on Q-Pulse which details the procedure required for the prescription of blood & blood components. This policy also details the correct procedure for the taking of the pre-transfusion sample by medical staff. (PPG-CUH-CUH-36). The procedure for the administration of blood & blood components is covered in the policy PPG-CUH-CUH-13, available on Q-Pulse.

Results	Results are issued in Hard Copy report format. **Note:** In the CUMH, transfusion results are available electronically through the MN_CMS Millennium Electronic Health Record. For any staff with access to transfusion results electronically, it is their responsibility to ensure that they satisfy themselves that the blood transfusion laboratory has a valid transfusion specimen and/or products available. It is the general policy of the laboratory not to issue results over the phone. Copy reports can be printed on request. In accordance with HSE policy, faxing of results can be facilitated in exceptional circumstances only. Users will be asked to fax a request for a faxed report, to ensure the laboratory can fax report to a secure fax number.
Advisory Services:	Should clarification be sought on any issues related to the Blood Transfusion Laboratory service at CUH, queries may be directed to Blood Transfusion Laboratory, Haemovigilance personnel or the clinical Haematology Team (Consultant Haematologists) as identified in this Handbook.
Complaints /Positive Feedback	The Blood Transfusion Laboratory at CUH endeavours to produce a system of continual improvement to meet the needs and requirements of users and in the best interest of patients. To facilitate this, the Blood Transfusion Laboratory welcomes all feedback (both Negative and Positive) from both service users and patients. Feedback can be provided by way of telephone call, email or in hard copy writing to contacts provided. All feedback will be processed in accordance with the laboratory's feedback / complaints system. In addition, the Blood Transfusion Laboratory and Haemovigilance team may carry out surveys to capture feedback to help implement improvements.
Data Protection / Patient Information Code of Conduct:	All staff in the laboratory are made aware of their responsibilities in relation to protection of personal patient information consistent with the Data Protection Act 2018 and Freedom of Information Act 2003. All records are retained in accordance with requirements outlined in EU Blood Directive 2002/98/EC and securely managed in accordance with local laboratory instruction MI-C-BTR-RECORDM.

Contingency	In the event that the laboratory's computer system fails, a manual contingency plan is in place. Users may be informed that a manual back-up

	system is in place and are requested to facilitate the laboratory by limiting requests to 'urgent requests' only, while IT systems are restored. In the extremely unlikely event that the laboratory is unable to provide a service (e.g. Fire/Flood Damage), the IBTS may provide a back-up service. Users may be requested to facilitate the laboratory by limiting requests to 'urgent requests' only, until service is restored on site in CUH.

12 TEST DIRECTORY (A-Z)

Acanthamoeba (amoebic keratitis)

Laboratory: Microbiology (Main laboratory)
Specimen: Corneal scrapings collected onto a specific swab obtained directly from the Microbiology Laboratory.
Comment: Swab must be transported directly to microbiology where it will be referred to the UK for PCR testing. Testing performed by Micropathology Ltd, Coventry.
Turnaround: 1 week (1 working day from receipt of swab in UK)
Report: Acanthamoeba PCR detected or not detected.

Acanthamoeba (corneal scrape)

Laboratory: Neuropathology
Specimen: Corneal scrape – special fixative required, (CytoLyt) available from Neuropathology Laboratory, 22519.
Comment: Please contact Neuropathology Department in advance on 4922520
Turnaround: 3 weeks – Positive results phoned

ACTH

Laboratory: Sample referred from CUH Biochemistry to Eurofins-Biomnis Laboratories
Specimen: Aprotinin EDTA or EDTA sample on ice, must be frozen < 30 minutes
Comment Consultant request only
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Activated Partial Thromboplastin Time (APTT)

Laboratory: Haematology
Specimen: Blood 3mL/1mL blue Vacuette® (sodium citrate 3.2%)
(Specimens which are haemolysed, under filled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.)
Comment: A screening procedure used to evaluate abnormalities in the Intrinsic Coagulation Pathway and to monitor the effectiveness of heparin therapy. Also forms part of the Thrombophilia and /or Lupus screen. See Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Please note that specimens should arrive in the laboratory within 4 hours of sampling.
Test available Monday to Friday, during routine working hours, and for emergency reasons at all other times.
Turnaround: Urgent specimens: 2 hours. Ward specimens: 8 hours
Ref. Range:

Age	Mean	Range (secs)
Day 1	43	31 - 55
Day 5	43	25 - 60
Day 30	41	26 - 55
Day 90	37	24 - 50
Day 180	36	28 - 43
Adult	27	See final report

Activated Protein C Resistance (APCR Test)

Laboratory: Haematology
Specimen: Blood 3mL, blue Vacuette® (sodium citrate 3.2%)
(Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling)

Comment:	Test available Mon to Fri, during routine working hours. This test forms part of a Thrombophilia Screen, used as a screening test for Factor V Leiden mutation, see Main Haematology Section on Guidelines for Investigation of Thrombophilia (if positive an EDTA sample is confirmed by PCR analysis). **Samples must be received within 4 hours of phlebotomy**. Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.
Turnaround:	3 – 4 weeks (Refer to the main Haematology Section on Coagulation).
Report:	Ratio > 0.7 Negative Ratio ≤ 0.70 Positive

Acyl Carnitine, blood spot

Laboratory:	Sample referred from Clinical Biochemistry to The Children's Hospital, Temple Street, Dublin
Specimen:	Newborn screening card. 2 full circles
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form.

Adenovirus Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, 4mL EDTA blood, viral swab (eye, throat), stool, nasopharyngeal aspirate, sputum, broncho-alveolar lavage, CSF, urine
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Adenovirus (faeces samples)

See Rotavirus/Adenovirus assay

Adrenal Antibodies

Laboratory:	Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround:	Approx. 3 Weeks
Ref. Range:	See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Alanine amino Transferase (ALT)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Albumin (Blood)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL in blood plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Albumin (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot or 24 hour urine sample

Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Albumin: Creatinine Ratio (urine)

Laboratory: Clinical Biochemistry
Specimen: Spot urine
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Alcohol (Ethanol) (See also Toxicology Screen)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in glucose tube, (Sodium Fluoride, grey-capped) or in plain tube (clotted sample) or in Lithium Heparin tube. Spot urine sample
Comment: Do Not use alcohol swabs. For acute medical emergencies only. Not useful for screening for alcohol abuse. Alcohol measurement is provided for clinical purposes only. Samples will not be accepted for medicolegal or workplace testing
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Aldosterone/Renin ratio

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories (Paediatric samples sent to Leeds General Infirmary)
Specimen: 4.0 mL blood in EDTA. State if the subject was standing (after at least 1 hour of walking) or recumbent (after at least 3 hours)
Comment: Consultant request only
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information.

Alkaline phosphatase (Alk Phos)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
GP or OPD- Results posted within 4 days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Alpha-1-Antitrypsin

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate If AAT result is <1g/L, sample is referred to the Alpha 1 Foundation.

Alpha-1-Antitrypsin Phenotyping

Laboratory: Sample referred from Clinical Biochemistry to Alpha 1 Foundation, Royal College of Surgeons in Ireland, Education and Research centre, Beaumont Hospital, Dublin 9.
Specimen: 0.2 mL serum
Turnaround: 5 weeks
Ref. Range: Contact Immunology dept.

Alpha- Amino Adipic Semialdehyde (á-AASA)

Laboratory:	Referred from Biochemistry to the Institute of Child Health, London
Specimen:	Spot Urine (5-10mls) on ice
Comment:	MUST BE FROZEN immediately. Used to support a diagnosis of Pyridoxal Responsive Epilepsy. Consultant request only
Turnaround:	6-8 weeks

Alpha Fetoprotein (AFP)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Amikacin / Amikin

Refer to Antibiotic Assays

Amoeba Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround:	28 working days
Report:	Qualitative result

Ammonia

Laboratory:	Clinical Biochemistry
Specimen:	Blood sample in Li Hep
Comment:	Please inform laboratory in advance. Sample must be received to the laboratory within 30 minutes of collection and spun immediately. Haemolysis invalidates result.
Turnaround:	Once the lab is contacted in advance, results could be ready in approx. 1 hour 15mins
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Amphetamine

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Amylase (Blood)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Amylase (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot or 24 hour urine sample
Turnaround:	1 Day
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Amyloid A (Serum)

Laboratory:	Sample referred from Clinical Biochemistry to National Amyloidosis Centre – Royal Free Hospital
Specimen:	Serum (0.5 ml minimum)
Turnaround:	9 weeks
Ref. Range:	See report form or contact National Amyloidosis Centre – Royal Free Hospital, +44 (0) 207 433 2800 / 2725 (Results), +44 (0) 207 433 2844 (Interpretation)

Amyloid Subtyping (Tissue)

Laboratory:	Sample referred from Pathology to National Amyloidosis Centre – Royal Free Hospital
Specimen:	Unstained sections (as per NAC protocol)
Turnaround:	14 weeks
Comment:	To discuss clinical advice, contact National Amyloidosis Centre – Royal Free Hospital, +44 (0) 207 433 2800 / 2725 (Results), +44 (0) 207 433 2844 (Interpretation)

Androstenedione (D4A)

Laboratory:	Sample referred from Clinical Biochemistry to St. James's University Hospital, Leeds
Specimen:	3.0 mL blood in a plain tube (clotted sample)
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form

Angelman Syndrome (AS)

Laboratory:	Biochemical Genetics refer to Clinical Genetics at CHI Crumlin. Consent form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Specimen:	Infants: 1ml EDTA blood Adults 3-5ml EDTA blood
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Angiotensin converting enzyme (ACE)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Antenatal Screen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Tests:	Rubella IgG, hepatitis B surface antigen, HIV Ag/Ab, syphilis antibody.
Turnaround:	Negative samples: 36 hours. Please allow extra time for samples testing positive in house for HIV Ag/Ab and syphilis antibody (confirmatory testing required).
Report:	Qualitative results; quantitative result for rubella IgG (IU/mL)

Antenatal Serology

(Blood Group + Antibody Screen +/- Antibody Identification +/- Titration)

Laboratory: Blood Transfusion Laboratory

Specimen: 1 x 6 ml EDTA Pink Capped Tube

Comment: Antenatal blood grouping and antibody screening and identification in antenatal women. (Patients may also include the male partners of pregnant women for the purposes of establishing their blood groups and red cell phenotypes in the prediction of HDNB).
Blood Group, Antibody Screen and Identification, Red Cell Phenotyping are INAB accredited tests.
Request Form to be completed: Antenatal Serology Request Form (LF-C-BTR-ANTENAT)

Turnaround: 2 days.
NOTE: Samples received on Fridays and during weekends may be processed during next routine working day.

Ref. Range: Not applicable

Antibiotic Assays

Laboratory: Microbiology

Specimen: 4mL clotted blood, **EDTA unsuitable**

Test method: Photometric absorbance

Turnaround: Assays are batched and performed at 7am, 11am, 3pm, 7pm and 11pm. Please ensure the sample is in the laboratory at least 30 minutes before the allocated batch time.

Report: Quantitative result (mg/L)

Comment: Available 7 days. Specify peak (post) or trough (pre). It is very difficult to interpret random specimens. All forms should indicate the time since the last administration of the drug. Please refer to the Cork University Hospital Antibiotic Guidelines.

Teicoplanin levels are rarely indicated and are not processed. Streptomycin and Cycloserine levels are performed by a reference laboratory (South Mead Hospital, Bristol).

Note for Gentamicin: In very rare cases, gammopathy in particular type IgM (Waldenström's macroglobulinemia) may cause unreliable results. In very rare cases, patient samples may contain particle agglutinating proteins (e.g. heterophilic antibodies or antibodies due to abnormal immunoglobulin synthesis, such as gammopathies like MGUS0 or Waldenström's macroglobulinemia) which may lead to incorrect low or high results with this assay. Please notify the laboratory when requesting a gentamicin assay if the patient has this type of gammopathy as an alternative assay method is required.

Antibiotic - once daily dosage	Trough
Amikacin - once daily dosage	<5 mg/L
Gentamicin - once daily dosage	<1 mg/L
Tobramycin - once daily dosage	<1 mg/L
Vancomycin - once daily dosage	10-20 mg/L *
*Trough levels of 15-20mg/L may be required to treat deep seated infections, please discuss this with the clinical Microbiology team	

Anti Cardiolipin Antibodies ACAB IgG and IgM

Laboratory: Haematology
Specimen: Blood 3.5 mL red Vacuette® (Serum)
Comment: Forms part of a Thrombophilia and/or Lupus screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia. Test available Mon to Fri during routine hours.
This assay is only available when requested as part of Thrombophilia/Lupus investigations.
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.
Turnaround: 3 - 4 weeks
Ref. Range: IgG 0 - 10 GPL /mL
IgM 0 - 7MPL /mL

Anti-CCP

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Quantitative immunoassay using Phadia Immunocap 250 analyser.
Test restricted to consultant requests.
Turnaround: 24 Hours
Ref. Range: 0 - 7 AU/mL

Anti-c Quantitation

Laboratory: Available by prior arrangement with Blood Transfusion Laboratory
Specimen: 2 x 6 mL EDTA Pink Capped Tube
Comment: Quantitations referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8.
Complete the Antenatal Serology request form LF-C-BTR-ANTENAT.
Please note 3 forms of identification are required: Name, DOB and hospital number (address acceptable if none available) on both sample and form
Please submit samples on Mondays if possible.
Turnaround: 3 Weeks for Hard Copy reports. Verbal result from IBTS within 7 days.
Ref. Range: Refer to IBTS report

Anti-D Quantitation

Laboratory: Blood Transfusion Laboratory
Specimen: 2 x 6 mL EDTA Pink Capped Tube
Comment: Quantitations referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8.
Complete the Antenatal Serology request form LF-C-BTR-ANTENAT.
Please note 3 forms of identification are required: Name, DOB and hospital number (address acceptable if none available) on both sample and form.
Turnaround: 3 Weeks for Hard Copy reports. Verbal result from IBTS within 7 days.
Ref. Range: Refer to IBTS report

Antifungal Assays (Voriconazole, Posaconazole)

Laboratory: Microbiology
Specimen: 4 ml Clotted serum sample, **EDTA not suitable**
Comment: This test is performed in a reference laboratory, Mycology Reference Centre, Bristol
Turnaround: 5 working days
Report: Numeric level in mg/L

Anti-neuronal Antibody Testing (Paraneoplastic Antibodies)

Laboratory: Neuropathology Department
Specimen: 4.0 ml of clotted blood (red top vacuette)
Turnaround: Approximately 2 weeks.

Anti Neutrophil Cytoplasmic Antibodies

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Immunofluorescence assay using Ethanol + Formalin fixed human Neutrophils as Substrate. Quantitative assays to detect auto antibodies against Proteinase 3 (PR3) and Myeloperoxidase (MPO) are automatically undertaken on sera showing associated positive immunofluorescent patterns.
Anti-PR3 and Anti-MPO are quantitative immunoassays automatically undertaken following positive immunofluorescence ANCA's on the Phadia Immunocap 250 analyser.
For stat PR3 and MPO testing please contact lab directly.
Turnaround: 24 Hours
Ref. Range: Not applicable

Anti Neutrophil Antibodies, Granulocyte Immunology and Auto immune Neutropenia

Laboratory: Referred from Haematology to NHSBT Centre, Bristol
Specimen: Clotted specimen and EDTA 6 mls
Comment: Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround: 64 working days
Report: Sent to referring clinician and copy filed in laboratory

Anti Nuclear Factor

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Part of Autoantibody Screen. Pattern reported. Titre not reported.
Turnaround: 24 Hours
Ref. Range: Not applicable

Anti-Platelet Antibody Investigation

Laboratory: Blood Transfusion Laboratory
Specimen: 3 mL Clotted (Red Capped/Yellow Ring) Tube
Comment: Samples referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8
Complete the Blood Transfusion request form.
Turnaround: 3 Weeks
Ref. Range: Not Applicable

Anti-Retina Antibodies (CAR antigen/Anti-recoverin antibodies)

Laboratory: Sample referred from Neuropathology Department to Eurofins-Biomnis Laboratories Lyon
Specimen: 1.0 ml of clotted blood (red top vacuette)
Turnaround: 3 weeks.
Ref. Range: See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information

Anti-Streptolysin-O Titre (ASOT)

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Turnaround: 36 hours
Report: Titre provided (IU/mL)
Comment: >200 IU/mL may indicate acute streptococcal infection

Anti Thrombin 3

Laboratory: Haematology

Specimen: Blood 3mL blue Vacuette® (sodium citrate 3.2%)
(Specimens, which are haemolysed, underfilled or overfilled, cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling)

Comment: Forms part of a Thrombophilia Screen.
See Main Haematology Section on Guidelines for Investigation of Thrombophilia. **Samples must be received within 4 hours of phlebotomy**
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.

Turnaround: 3 – 4 weeks

Ref. Range:

Age	Range (%)
Day 1	39– 87
Day 5	41 – 93
Day 30	48 – 108
Day 90	73 – 121
Day 180	84 - 124
Adult	80 - 120

Apixaban

See DOAC's- Direct Orla Anti-coagulants.

Ascitic Fluid

See Sterile Body Fluid – Microscopy and Culture or Cytology

Aspartate amino Transferase (AST)

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain tube (clotted sample)

Comment: Haemolysis invalidates result

Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Aspergillus Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)

Turnaround: 28 working days

Report: Quantitative result with an interpretative comment

Aspergillus Antigen (Glactomannan)

Laboratory: Microbiology (Main Lab)

Specimen: Bronchial lavage **(Sputum samples unsuitable for testing)**

Comment: Performed by a reference laboratory (Mycology reference laboratory, Bristol)

Turnaround: 28 working days

Report: Negative or Positive with Titre

Astrovirus

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	A fresh liquid faeces specimen is essential. 1-2mL is sufficient.
Comment:	Test not routinely available. Test seasonally available in-house, otherwise, test will be referred to external laboratory. Please discuss with the Microbiology Medical team if required. A Target Not Detected result does not automatically exclude infection from the above enteric pathogen as the level of DNA present may be lower than the limit of detection of the assay.
Turnaround:	In-house: 5 working days; External referral: 2 weeks.
Report:	Target Detected or Target Not Detected for Astrovirus.

Autoantibody Screen

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Includes: Anti Nuclear Factor +/- Anti-dsDNA and Extractable Nuclear Antigen if ANF Positive + Anti-Mitochondrial, Anti Smooth Muscle and Anti-Gastric Parietal Cell Antibodies
Turnaround:	24 Hours
Ref. Range:	Not applicable

Autopsy (CNS cases)

Laboratory:	Neuropathology Coroner's cases and Consent Autopsy protocols are shared with Histopathology (see HISTOPATHOLOGY section), please contact the post-mortem room on 22525. For post-mortems on CNS disease cases, please contact the consultant Neuropathologist on duty (22520/22519). Examinations on high-risk, suspected prion disease cases are conducted in the CJD surveillance centre in Beaumont Hospital, contact 01-8377755
Turnaround:	6-8 weeks

Avian Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround:	28 working days
Report:	Quantitative result with an interpretative comment

Azole Levels (e.g. fluconazole, itraconazole, isavuconazole etc)

Laboratory:	Microbiology
	Blood: 4.0 mL blood in a plain tube (clotted sample) – Clotted samples with a gel plug are unsuitable. Performed by a reference laboratory (Mycology Reference Laboratory Southmead Hosp Bristol UK)

Barbiturates

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Blood: 4.0 mL blood in a plain tube (clotted sample). Urine: spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Bartholin's Abscess

Laboratory:	Microbiology (Main laboratory)
Specimen:	Aspirate using a syringe (ideally a minimum of 1mL) or using a sterile swab. *Note:* Do not send needle. Specimens should be taken before antimicrobial therapy where possible. The volume of specimen influences the transport time that is acceptable. Larger volumes of purulent material maintain the viability of anaerobes for longer. Transport ASAP in charcoal containing transport media. The viability of *N. gonorrhoeae* is lost over time.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Prelim: 24 hours; Final: 72 hours
Report:	Microscopy report (aspirates only) on the presence or absence of Intracellular Gram-negative diplococci and WBCs. Culture report: Any clinically significant isolate with the appropriate sensitivities.

BCR ABL (Philadelphia Chromosome)

Laboratory:	Haematology referred to Cancer Molecular Diagnostics, CMD, St James Hospital Dublin
Specimen:	3 x 3 mL purple Vacuette (EDTA) blood or bone marrow in 10mL RPMI. Available Mon to Thurs to reach the laboratory before 12 noon on the day of sampling
Comment:	BCR-ABL associated with Ph+ CML, Ph+ ALL
Turnaround:	60 working days
Report:	Sent to referring clinician and copy filed in laboratory

Bence - Jones protein

Laboratory:	Clinical Biochemistry (Immunology Laboratory)
Specimen:	20 mL urine
Comment:	As of June 6th requests for BJP are limited to Haematology Consultant request only
Turnaround:	4 Days
Ref. Range:	Should be NEGATIVE

Benzodiazepines

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Blood: 4.0 mL blood in a plain tube (clotted sample). Urine: spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Beta-1-3-glucan

Laboratory:	Microbiology
Specimen:	Serum/BAL/CSF
Comment:	Sample must be sent to the laborsatory immediately post collection, if sample is delayed it will be rejected. **Sputum samples are unsuitable** for processing. Test performed by Mycology Reference laboratory, Bristol
Turnaround:	14 days
Ref. Range:	Negative, Positive with Titre

Beta 2 Glycoprotein 1 (Anti beta 2GP1)

Laboratory: Haematology
Specimen: Blood 3.5 mL red Vacuette® (Serum)
Comment: Forms part of the Lupus or Thrombophilia Screen.
This assay is only available when requested as part of Thrombophilia investigations.
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.
Turnaround: 4-6 weeks
Ref. Range: IgG Normal: < 5U/mL
Borderline: 5-8U/mL
Elevated: >8U/mL

Beta-2-Microglobulin

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Comment: Consultant request only
Turnaround: 2 weeks
Ref. Range: See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information

Bicarbonate (Plasma)

Laboratory: Clinical Biochemistry
Specimen: Fresh 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Bile Acids

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 2 days, GP or OPD- Results posted within 4 days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Bilirubin- Direct

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample) must be light protected if not recieived in the lab in <3 hours'
Comment: Spun serum smple stable for 7 days at 2-8oC
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate. Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Bilirubin- Total

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Aged sample invalidates results
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

BK Virus Molecular

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood, 4mL EDTA blood, urine

Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)

Turnaround: 14 working days

Report: Detected (viral load) or not detected

Blood Culture

Laboratory: Microbiology (Main laboratory)

Specimen: The blood culture vials and instrument in use are the BACTEC fluorescent system (Becton-Dickinson & Co. Ltd). An exception is the investigation for mycobacteria (see Mycobacteriology section). Blood culture vials should be kept at a cool room temperature in the wards (2-25°C). The number of vials stored in each ward should be limited to their general usage and excessive stocks avoided. There is an expiry date on each vial and they should not be used after this date.

Adults:	Preferably, a volume of 8-10mL of specimen per vial.
Children /neonates:	Use paediatric vials – preferably, a volume of 1-3mL (the volume of blood should be no more than 1% of the patients total blood volume). No need for lytic/anaerobic vial unless clinically indicated.

Note: Do not exceed the manufacturer's recommended maximum volume for each bottle.

Comment: If blood for other tests such as blood gases or ESR is to be taken at the same venepuncture, the blood culture bottles should be inoculated first to avoid contamination. It is preferable to take blood for culture separately.

Disinfect the skin at the venepuncture site with isopropyl alcohol and allow to dry. Disinfect the septum of the blood culture bottle with alcohol and allow to dry.

For diagnosis of bacteraemia withdraw blood from a peripheral vein and divide the specimen equally among blood culture vials, ensuring that the needle is changed between bottles. If the patient has a central line or other vascular access site, it is often appropriate to take both central and peripheral blood cultures.

For neonates consider the use of a single aerobic paediatric vial appropriate for small volumes of blood.

If necrotising enterocolitis is suspected and sufficient blood is obtained, inoculate a paediatric and a lytic/anaerobic bottle.

Indicate if specific organisms are sought e.g. causative organisms of infective endocarditis. Consider bone marrow aspirate rather than blood sample for the diagnosis of thyphoid fever and brucella species.

Blood cultures should be transported to the laboratory as soon as possible (within 4 hours) after venepuncture as delays can lead to false negative results.

NB. Do not refrigerate or place on radiators, incubators or direct sunlight. The pneumatic tube can be utilised to transport **plastic** blood culture vials and is preferable to avoid unnecessary delays.

Turnaround: Most organisms will be detected within 24-48 hours and normally blood cultures are incubated for 5 days, but this time may be extended e.g. 10

days if endocarditis is suspected or 7 days for bone marrow up to 21 days for slow growing organisms.

Report: A provisional report is issued at 48 hours and a final report at 5 days if the blood culture is negative.
Positive results are phoned as soon as available to the requesting area or team.

Blood Gas

Laboratory: Point of Care Testing

Specimen:
- Li Hep syringe (Arterial, Venous) or Li Hep capillary
- (Serum sample for direct sodium in Biochemistry Lab only)

Comment: Sample should be analysed with 15 minutes at the Point of Care site. Ensure Proper mixing of the sample before analysis. Blood Gas samples must **NOT** be sent via pneumatic shute system.

Turnaround: 15 Minutes

Radiometer Blood Gas Analysers:

Sample Volume:	
65 µl	Blood Gas, Electrolytes, Metabolites & Co-Ox (pH, pCO_2, pO_2, Na^+, K^+, Ca^{++}, Cl^-, Glucose, Lactate, tHb, sO_2, O_2Hb, COHb, MetHb, HHb, Bilirubin)

Siemens Blood Gas Analysers :

35 µl –RL1240	Blood Gas (pH, pCO_2, pO_2)
100µl–RP500e	Blood Gas (pH, pCO_2, pO_2)
100µl–RP500e	Blood Gas & Electrolytes (pH, pCO_2, pO_2, Na^+, K^+, Ca^{++}, Cl^-)
100µl–RP500e	Blood Gas, Electrolytes & Metabolites (pH, pCO_2, pO_2, Na^+, K^+, Ca^{++}, Cl^-, Glucose, Lactate)
100µl–RP500e	Blood Gas, Electrolytes, Metabolites & Co-Ox (pH, pCO_2, pO_2, Na^+, K^+, Ca^{++}, Cl^-, Glucose, Lactate, tHb, sO_2, O_2Hb, COHb, MetHb, HHb, Bilirubin)

Ref. Range:

Parameter	Arterial (1)	Venous (2)	Neonatal Capillary(2)
pH	7.320–7.450	7.32 -7.45	7.31 – 7.47
H^+	47.9–35.5	47.86 - 35.48	48.98 -33.88
pCO_2 (kPa)	4.27–6.40	5.19 – 7.33	3.79 – 6.49
pO_2 (kPa)	11.07–14.40	3.99 – 7.33	4.39 -8.1
Na^+(mmol/L)	136 – 145		
K^+ (mmol/L)	3.4 - 4.50		
Cl^- (mmol/L)	98 - 107		
iCa^{++} (mmol/L)	1.15 - 1.33		1.06 – 1.34
Glu (mmol/L)	3.6 - 5.3		2.1 – 5.3
Lac (mmol/L)	0.36-1.39	0.56-1.39	1.4 – 4.1
Bicarb (mmol/L)	19-24(2)	22-26	
tHb (g/dL)	12.0- 17.5		14.5 – 23.4
$Hct_{(c)}$ (%)	35 - 51		
O_2Hb (%)	94.0 - 98.0		
COHb	0.5 - 1.5		
MetHb	0.0-1.5		
HHb (%)	0.0 - 5.0		
sO_2 (%)	95 - 98.0	~75	
$HCO3^-$(c) (mmol/L)	22.0 - 26.0	21 - 30	
BEecf (mmol/L)	-2.0 - 2.5	-3.0 - +3.0	
nBilirubin (umol/L)			102 -136.8 (Neonate <1 day)(1) 136.8 – 205 (Neonate 1-2 days)(1) 205 – 273.6 (Neonate 3-5 days)(1) 5.13 -34.2 (adult)(1)

1. Tietz NW, *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*, 7th Edition, C. Burtis and D. Bruns; Elsevier Saunders, 2015.
2. Tietz NW, *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*, 4th Edition, C. Burtis and D. Bruns; Elsevier Saunders, 1995.
3. Reference range for serum sample for direct sodium measurement is as per arterial range

Blood Group and Coombs

Laboratory: Blood Transfusion Laboratory

Specimen: 1 x 6 ml EDTA Pink Capped Tube
For Newborns: Cord Blood Sample in 6 ml EDTA Pink Capped Tube.
For Paediatrics: 1 ml EDTA (Purple Cap/White Ring) Paediatric Bottle.

Comment: Consists of Blood Group and Direct Coombs Test. Usually performed on Newborns.
Complete the Blood Transfusion request form LF-C-BTR-BBCORD or LF-C-BTR-XMATCH.
Blood Group and Direct Coombs Test are INAB Accredited tests.

Turnaround: 24 hours. (Note: may be shortened to 1 hour in emergency)

Ref. Range: Not Applicable

Blood Group and Crossmatch

Laboratory: Blood Transfusion Laboratory

Specimen: 1 x 6 ml EDTA Pink Capped Tube
For Paediatrics: 1 ml EDTA (Purple Cap/White Ring) Paediatric Bottle.
Note: May require sample from mother of infant for crossmatching: 6 ml EDTA Pink Capped Tube

Comment: Samples for crossmatching for elective surgery must arrive in the laboratory before 5 p.m. on day before surgery to avoid undue delay. Blood is crossmatched in batches and in accordance with the locally agreed Maximum Surgical Blood Ordering Schedule (MSBOS), except in exceptional cases. Arrangements are in place for the emergency issue of blood. In exceptional circumstances, blood may be issued uncrossmatched on request.
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
The laboratory accepts "Add-On" requests for additional units to be crossmatched when appropriate. These requests must be accompanied with a completed written Blood Product Requisistion Form LF-C-BTR-PROREQ.
Crossmatch is an INAB accredited test.

Turnaround: 3 Hours. (Note: The presence of irregular antibodies, or the need special requirements can lead to significant delays in efforts to obtain appropriate blood).
Routine (non-urgent) samples will be processed during routine hours unless specified as an emergency.
In emergencies the laboratory will attempt to provide crossmatched blood within 40 minutes to 1 hour (when possible i.e. no antibodies).
These turnaround times apply to "Add On" requests for blood also.
The Blood Transfusion Laboratory has introduced the ELECTRONIC ISSUE (EI) of red cell concetrates in Aug 2022. If a patient meets the parameters and once the Group & Hold has been processed, fully 'electronically crossmatched blood' may be issued in 5-10 minutes

Ref. Range: Not Applicable

Blood Group and Hold

Laboratory: Blood Transfusion Laboratory

Specimen: 1 x 6 ml EDTA Pink Capped Tube
For Paediatrics: 1 ml EDTA (Purple Cap/White Ring) Paediatric Bottle.

Comment: Blood is grouped and an antibody screen is performed. The sample is then held in the laboratory for 72 hours @ 2-8^{o}C. Blood may be crossmatched subsequently on that sample within 72 hours of collection.
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
Blood Group, Antibody Screen and Antibody Identification are INAB accredited tests.

Turnaround: 4 Hours. (Note: Group and hold samples are processed in batches in the laboratory. The presence of irregular antibodies can lead to significant delays in order to identify such antibodies).
Routine (non-urgent) samples will be processed during routine hours unless specified as an emergency.
In emergencies the laboratory will attempt to complete the group and hold within 40 minutes to 1 hour (when possible i.e. no antibodies).

Ref. Range: Not applicable

Blood Transfusion Reaction Investigation

Laboratory:	Blood Transfusion Laboratory
Specimens:	1 x 6 ml EDTA Pink Capped Tube and 2 x 4ml clotted sample (red cap yellow ring).
Comment:	Complete the Blood Transfusion request form LF-C-BTR-XMATCH. Tests may include Blood Group, Antibody Screen, Antibody Identification, Crossmatch, Direct Coombs Test, Red Cell Phenotyping. These are all INAB accredited tests. Ensure that the unit/product implicated in suspected transfusion reaction is returned to the laboratory as soon as possible. Ensure the Transfusion Reaction details are completed on the last page of the Blood Compoment Prescription and Transfusion Record (Report of a suspected Transfusion Reaction).
Turnaround:	4 Hours.
Ref. Range:	Not applicable

NT-proBNP (Brain Natriuretic Peptide)

Laboratory:	Biochemistry
Specimens:	4.0 mL blood in a plain tube (clotted sample)
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	4 days
Ref. Range:	See report form.

Bone Marrow Examination (Haematology)

Laboratory:	Haematology
Specimen:	Fresh bone marrow air-dried films. Specimen must be labelled in lead pencil with the patient's name, MRN and DOB and sent to the Haematology Dept. ASAP
Comment:	Examinations are undertaken for the investigation of patients with leukaemia, anaemia, myeloma, lymphoma, myeloproliferative disorders, thrombocytopenia and unexplained cytopenias.
Turnaround:	Urgent marrows must be labelled as such and can expect a turn around time of 24 hours. Examples of urgent include suspected acute leukaemia, ITP in a child, myeloma with renal failure. Such marrows will also have verbal results phoned to requesting team the same day. Other indications can expect a TAT of up to two weeks for completed reporting including iron staining. However significant preliminary reports will be phoned by the reporting haematologist.
Ref. Range:	Not applicable

***Bordetella pertussis* Antibodies**

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Test performed by a reference laboratory (Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU), London)
Turnaround:	28 working days
Report:	Quantitative value with interpretative comment. In the absence of recent vaccination, values > 70 IU/mL are consistent with recent infection.

Bordetella Species Culture (Whooping Cough)

Laboratory: Microbiology (Main laboratory)

Specimen: Specialist collection according to local protocols.
A Pernasal swab (Dacron ™ with flexible wire shaft) is inserted through a nostril and advanced along the floor of the nose until it reaches the nasopharynx. It has been suggested that the swab be held against the posterior nasopharynx for up to 30 seconds or until the patient coughs. In practice, it is more likely that a patient will only be able to tolerate this for a few seconds.
Note: Cough plates and throat swabs are unsatisfactory and will not be processed.
The laboratory must be notified in advance and transport specimens ASAP. *B. pertussis* is very susceptible to drying and is a very slow grower, so transport must keep the organism moist and prevent overgrowth of normal flora. Culture plates may be inoculated at the bedside.

Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.

Turnaround: 7 days

Report: *Bordetella pertussis* not isolated *or Bordetella pertussis* / *parapertussis* isolated.

Brain examinations (post mortem)

Laboratory: Neuropathology

Specimen: Formalin-fixed brain / spinal cord

Comment: Post-mortem brain referrals are from Consultant Pathologists, please refer to the protocol for brain referrals (Neuropathology Department Information for Users).

Turnaround: In general brain post mortem examinations are completed within 3 months although this does depend on other investigations performed and the complexity of the case.

Brain tumour – molecular analysis for 1p19q and MGMT methylation status, BRAF fusion qPCR, IDH1&2 Pyrosequencing analysis and DNA methylation profiling

Laboratory: Referred by Neuropathology to the Molecular Laboratory, Beaumont Hospital

Specimen: Brain tumour biopsy

Comment: Processed in Pathology department before referral.

Turnaround: 9 weeks.

BRCA gene testing- Tumour

Laboratory: Referred by Pathology to CMD, St. James Hospital

Specimen: FFPE tissue block

Comment: Test requests must be accompanied by a completed BRCA test request and consent form available on the St. James website.

Turnaround: 8 weeks

BRCA (Somatic) testing

Laboratory: Referred by Pathology to Beaumont Hospital

Specimen: FFPE tissue block

Turnaround: 6 weeks

tBRCA/HRD testing

Laboratory: Referred by Pathology to CMD, St. James Hospital

Specimen: FFPE tissue block

Turnaround: 4 weeks

Breast Needle Core Biopsy Calcified and Non-Calcified

Laboratory: See formalin fixed histolopathology specimens

Bronchial/Nasal Brushings for PCD analysis

Laboratory:	Histopathology (Electron Microscopy/ Renal) (referred to Primary Ciliary Dyskinesia (PCD) Diagnostic Service, University Hospital Southampton)
Specimen:	Bronchial and Nasal brushings in 3% glutaraldehyde.
Comment:	Contact the laboratory in advance on extension 21315 or by e-mail to arrange collection of Glutaraldehyde Fixative.
Turnaround:	14 weeks

Bronchoalveolar Lavage Fluid Culture

Laboratory:	Microbiology (Main laboratory)
Specimen:	Specialist collection according to local protocols. It is difficult to be specific on volume required; in principle as large a volume as possible is preferred (up to 30mL). The specimen should be collected into a clean, sterile, leakproof container and transported to the laboratory ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. Please include any appropriate clinical details e.g. "Cystic fibrosis patient". If an unusual pathogen is suspected, the laboratory should be informed, *e.g. Burkholderia pseudomallei* and *Nocardia* sp require longer incubation of cultures. Refer to Mycobacteria Testing for instructions for collection for TB.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request. Traps containing a specimen should be properly sealed. Do not send tubing to the laboratory.
Turnaround:	Prelim: 24 hours; Final: 48-72 hours
Report:	Aerobic culture with sensitivities, if appropriate, as well as microscopy and culture for Mycobacteria.

Brucella Antibodies (IgG, IgM and Total)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	28 working days
Report:	Quantitative titre provided with interpretative comment
Comment:	Performed by a reference laboratory (Brucella Reference Unit (BRU), Liverpool). Not routinely available, please contact Microbiology Medical Team. A negative result generally excludes a diagnosis of brucellosis. Positive Brucella agglutination reactions should be regarded as supportive evidence for the diagnosis of brucellosis provided there is reasonable epidemiological and clinical evidence to suggest the diagnosis. A rising or falling titre is more significant than a single titre.

Bursa Fluid

See Sterile Body Fluid – Microscopy and Culture.

C1 Esterase Inhibitor (Function)

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	4.0 mL blood in a plain tube (clotted sample) + 5 mL citrated whole blood on ice.
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information.

C1 Esterase Inhibitor (Total)

Laboratory;	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	4.0 mL blood in a plain tube (clotted sample
Comment:	Consultant request only

Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information.

C3 / C4 (Complement)

Laboratory: Clinical Biochemistry (Immunology Laboratory)
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

CD3 / CD4/ CD8 / CD19 / CD56 Counts

Laboratory: Haematology
Specimen: Blood 3mL x 1, purple, Vacuette® (EDTA).
Comment: A screening procedure to monitor the immune status of patients / clients. Test available Mon to Fri during routine working hours.
Turnaround: 24 - 72 hours
Ref. Range

CD 3 Absolute Counts / μL		CD4 Absolute Counts /μL		CD8 Absolute Counts /μL	
Age	Low High	Age	Low High	Age	Low High
Day 6	900 - 5,000	Day 6	500 - 3,400	Day 6	300 - 1900
Month 2	2,800 - 7,000	Month 2	2,100 - 4,900	Month 2	500 - 1600
Year 2	1,600 - 6,700	Year 2	1,000 - 4,600	Year 2	400 - 2100
Year 5	900 - 4,500	Year 5	500 - 3,400	Year 5	300 - 1600
Year 10	700 - 4,200	Year 10	400 - 2,000	Year 10	300 - 1800
Year 16	700 - 3,500	Year 16	400 - 2,000	Year 16	200 - 1200
Adult	690 - 2,540	Adult	400 - 1,590	Adult	190 - 1140

CD 19 Absolute Counts / μL		CD 56 Absolute Counts / μL	
Age	Low High	Age	Low High
Day 6	200 - 1,100	Day 6	200 - 1,900
Month 2	300 - 1,900	Month 2	300 - 1,000
Year 2	600 - 2,700	Year 2	200 - 1,200
Year 5	200 - 2,100	Year 5	100 - 1,000
Year 10	200 - 1,600	Year 10	90 - 900
Year 16	200 - 600	Year 16	90 - 900
Adult	90 - 660	Adult	90 - 590

C Peptide

Laboratory: Clinical Biochemistry
Specimen: 2.0 mL blood in a plain tube (clotted sample) at 4^0 C.
Comment: Consultant request only. Urgents available on request
Turnaround: 7 days
Ref. Range: C-peptide levels should be appropriate to the glucose level at the time the sample was taken. Glucose should always be measured at the same time as the C-peptide to facilitate interpretation of results

CA 125

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

CA 15-3

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood a plain tube (clotted sample)
Turnaround: 4 days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

CA 19-9

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Calcitonin

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 4.0 mL blood in a plain tube (clotted sample) on ice must be frozen < 4 hours.
Comment: Consultant request only
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information.

Calcium (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Aged samples may invalidate result.
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Calcium (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 Hr acidified sample
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Calcium: Creatinine Clearance

Laboratory: Clinical Biochemistry
Specimen: Spot urine sample and clotted blood sample
Turnaround: 1 day
Ref. Range: Contact Biochemistry laboratory

Calcium Sensing Receptor (CASR) Mutation analysis

Laboratory: Referred from Biochemical Genetics to Exeter NHS.
3ml EDTA blood
Specimen: 3-5ml EDTA blood
Comment: Use the request form at https://www.exeterlaboratory.com/wp-content/uploads/SWGLH-Genomic-Test-Request-Form-v1.3.pdf
Please note: invoices will be issued to the referring clinician.
Turnaround: See website
Report: Sent to referring clinician and copy scanned to biochemical genetics.

Calculated Globulin (GLOB)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Calculation involving the measurement of both Total Protein and Albumin on all patients >16 years
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Calprotectin

Laboratory:	Referred from Biochemistry to City Hospital, Birmingham
Specimen:	5-10mg stool
Comment:	Test helps distinguish IBD from IBS
Turnaround:	2 weeks

Cannabis

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

CAPD

See Continuous Ambulatory Peritoneal Dialysis Fluid

Carbamazepine

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Range quoted is appropriate for a trough sample.
Turnaround:	1 Day, TAT for GP requests is 4 days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Carbapenamase Producing *Enterobacteriales*

Laboratory:	Microbiology (Main laboratory)
Specimen:	Rectal swabs, placed in charcoal containing transport media.
Comment:	Test performed Monday to Friday 9-5pm. Label all Microbiology forms with CPE SCREEN. Indicate if the patient was previously CPE positive or CPE contact. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.
Turnaround:	Prelim: 24 hours; Final: 48-72 hours.

Carbapenamase Producing *Enterobacteriales* PCR

Laboratory:	Microbiology (Main laboratory)
Specimen:	Rectal swab, placed in PCR transport media. Contact Microbiology Laboratory for appropriate sterile transport swabs. **Specimens are only processed where there is prior agreement with the Consultant Microbiologist or the Infection Control Team.**
Comment:	Test performed Monday to Friday 9-5pm. Label all Microbiology forms with CPE SCREEN. Indicate if the patient was previously CPE positive or CPE contact. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.

Turnaround: Final Result: 24 hours.

Carboxyhaemoglobin

Laboratory: Clinical Biochemistry
Specimen: Li Hep syringe
Turnaround: 1 hour 15 mins
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cardiothoracic specimens

Laboratory: See formalin fixed histolopathology specimens

Carnitine, Free & Total

Laboratory: Sample referred from Clinical Biochemistry to Sheffield Children's NHS Trust
Specimen: 1.0 mL blood in a plain tube (clotted sample) or Lithium Heparin sample on ice, must be frozen < 30 mins.
Comment: Consultant request only
Turnaround: 3 weeks
Ref. Range: See report form

Catecholamines – Urine

Comment: No longer available as of March 2024. Please refer to Urinary Metanephrines.

Catheter / Intravascular Cannulae

Laboratory: Microbiology (Main laboratory)
Specimen: Disinfect the skin around the cannula entry site, remove cannula using aseptic technique, and cut off 4cm of the tip into a sterile container using sterile scissors. The specimen should be collected into a clean, sterile, leakproof container and should be transported ASAP to prevent drying. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment: Not routinely processed, if required please contact the medical team. If infection considered clinically likely please take blood cultures through the cannula.
The routine culture of devices removed for other reasons is unnecessary.
Urine catheters are not cultured since growth represents distal urethral culture. A urine specimen is more appropriate. Skin disinfection procedures depend on local protocols and may vary.
Turnaround: Prelim: 24 hours;
Final: 48-72 hours
Ref. Range: Culture: Any clinically significant isolate with the appropriate sensitivities.

CEA

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Centromere B Protein

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa assay. Specific assay undertaken following Positive Anti ENA Screen.
Turnaround: 72 Hours
Ref. Range: Not applicable

Cerebrospinal Fluid (CSF) – Biomarkers (Amyloid, Tau)

Laboratory:	Referred from the Immunology Dept CUH to Immunology Dept, St James's Hospital, Dublin 8.
Specimen:	2.5 mL CSF specimen collected in to a polypropylene tube. Sample must be centrifuged within 2 hours of collection
Comment:	Polypropylene tubes are available from the Immunology Lab, ext 22535.
Turnaround:	Contact the Immunology Dept, St James's Hospital, Dublin 8, ph 01-4162925
Ref. Range:	Contact St James's for interpretation ph 01-4162925

Cerebrospinal Fluid (CSF) - Culture and Microscopy

Laboratory: Microbiology (Main laboratory)

Specimen: Ideally, the laboratory should receive a minimum volume of 1mL in a universal container **AND SHOULD BE SAMPLE NUMBERS 1 AND 3**. The specimen should be collected into a clean, sterile, leakproof container.

Information regarding suspected Prion disease MUST be indicated on the request form; the CSF MUST be double-bagged and marked with a biohazard label.

For Mycobacteria, as large a volume as possible should be sent (given the patient's clinical circumstances). All specimens should be taken before antimicrobial therapy where possible, but therapy should not be delayed unnecessarily pending lumbar puncture.

Comment: Test performed as an urgent specimen. Do not refrigerate specimen. Do not send through the pneumatic tube. CSF is normally collected sequentially into separate containers. Common practice is to send the first and third specimens taken for microbiological examination and the second specimen for Biochemistry. If only one specimen of CSF is collected, it should be submitted to Microbiology first. Transport specimens ASAP directly to the laboratory. Do not refrigerate samples if delays in transportation are encountered. Cells disintegrate and a delay may produce a cell count that does not reflect the clinical situation of the patient. Prior notification to the laboratory in cases of suspected CJD /vCJD.

CSF, EDTA blood specimens may be sent to the Meningococcal Reference Laboratory for PCR. All isolates of *N. meningitidis* are referred for serotyping. All lymphocytic CSFs (WBCs >5/cmm) are routinely sent for Mycobacterial testing. With lymphocytic CSFs consideration should be given to other tests such as Viral PCR (CMV, HSV and VZV). With a culture negative lymphocytic CSF, a clearly labelled stool specimen for enteroviral investigation should be considered.

CSF samples which have an elevated white cell count as detailed below with the exception of shunts and CSF samples from Haematology and Neurology patients, these are internally reflexed to the Biofire FA/ME panel where requested by clinical team using green Microbiology form. CSF samples with normal white cell count that require virology investigation refer to Section CSF Viral screen or for meningococcal investigation See *Neisseria meningitidis* PCR or meningococcal PCR sections

As the CSF specimen volume is limited, it is worth doing serology for antibodies to viral agents. The CNS Screen includes Mumps, Measles, Herpes Simplex and Varicella-zoster. Likewise serology for systemic syndromes associated with meningoencephalitis such as HIV, syphilis and Lyme Disease should be considered. If the patient is immunosuppressed Cryptococcal meningitis should be considered.

Turnaround: Microscopy: Within 2 hours of receipt. Urgent positive report telephoned when available.
Culture: Prelim: 24 hours; Final: 48-72 hours. Culture may be prolonged for fungal investigation if required (up to 14 days)
Where Biofire is performed (cases where White cell count is elevated) results will be available within 3 hours non-urgent cases may take longer. Positive results will be phoned when available.

Report: Report on the gross appearance of the CSF, the presence of a clot if applicable.
Microscopic report on the numbers of WBCs/cmm and RBCs/cmm.

Normal CSF cell counts

Leucocytes	Neonates < 28 days old	0-30 cells/cmm
	Infants 1-12 months	0-15 cells/cmm
	Children/adult > 1year	0-5 cells/cmm
Erythrocytes	No RBC's should be present in a normal CSF	
A WBC: RBC ratio of 1:500 is generally regarded as not indicative of infection		

A Gram stain is performed on all CSF specimens with a white cell count above the normal range as indicated above.
A differential leucotye count is reported where sufficient cells are counted ≥ 20 WBC s/cmm. Cell counts <20 WBC/cmm the predominating WBC will be reported with comment insufficient WBC for accurate differential. Cell counts are not performed on specimens containing a clot, which would invalidate the cell count.
Culture: Any organism isolated with the appropriate sensitivity results.

Cerebrospinal Fluid (CSF) - Cytology

Laboratory: Neuropathology or Histopathology (Cytology Department)
Specimen: Ideally the specimen should contain a minimum of 3ml. and be collected in a sterile universal container and be delivered to the laboratory before 4pm.
Comment: This test is performed as an urgent sample. If there is delay in sending the sample to the laboratory it should be stored at 4°C.
Samples from patients with suspected CJD should be sent to Neuropathology and not Cytopathology.
Information regarding suspected Prion disease MUST be indicated on the request form.
Turnaround: 2 days
Ref. Range: Not applicable

CSF Pyridoxal Phosphate

Laboratory: Referred from Clinical Biochemistry to the National Hospital for Neural and Neurosurgery
Specimen: 1.5 mL CSF specimen
Turnaround: 6 weeks
Ref. Range: See report

Cerebrospinal Fluid (CSF) – Glucose

Laboratory: Clinical Biochemistry
Specimen: 1.5 mL CSF specimen
Comment: Fresh sample required, otherwise, sample should be kept in paediatric glucose bottle.
Turnaround: 1 hour 15 mins
Ref. Range: 2/3 plasma glucose value

Cerebrospinal Fluid (CSF) – Neurotransmitters

Laboratory:	Referred from the Immunology Dept, CUH to the Neurometabolic unit, Queens Square, London,
Specimen:	Contact laboratory prior to specimen collection. CSF specimen containers to be collected from Immunolgy laboratory, CUH. Samples are transported on dry ice to the Immunolgy laboratory, (ext 22535)
Comment:	It is essential to contact the laboratory prior to collection to ensure the availability of dry ice.
Turnaround:	Contact Neurometabolic unit, Queens Square, London, ph 00-44-20-344-83844
Ref. Range:	Contact Neurometabolic unit, Queens Square, London, ph 00-44-20-344-83844

Cerebrospinal Fluid (CSF) – Oligoclonal bands

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	0.5 mL CSF and 4.0 mL blood in plain tube (clotted sample)
Turnaround:	3 weeks
Ref. Range:	Oligoclonal Bands should be NEGATIVE

Cerebrospinal Fluid (CSF) – Protein

Laboratory:	Clinical Biochemistry
Specimen:	1.5 mL CSF specimen
Comment:	Presence of blood in sample will affect results
Turnaround:	1 hour 15 mins
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cerebrospinal fluid (CSF) – RT-QuIC

Laboratory:	Neuropathology
Specimen:	2-3 mL clear CSF in a universal container. CSF should be transported as soon as possible to Neuropathology for freezing. If there is delay in sending the sample to the laboratory, it should be stored at 4°C. Details of storage conditions should be recorded on the form. The information regarding suspected Prion disease MUST be indicated on the request form. Blood-stained samples are not suitable. EEG results must be available before the sample is analysed.
Comment:	Specimens are referred to the Irish National CJD Surveillance Unit, Neuropathology Dept., Beaumont Hospital. Specific request forms provided by the CJD surveillance unit in Beaumont are available from the Neuropathology office (22520) and on Q-pulse. These incorporate the clinical information required to interpret the results and must accompany the CSF specimens.
Turnaround	Approx. 4 weeks. If a result is required more urgently please contact Neuropathology.)

Cerebrospinal Shunts

Laboratory:	Microbiology (Main laboratory)
Specimen:	CSF is usually obtained from the shunt reservoir and sent concurrently for investigation. When a shunt is removed all three portions should be sent in separate containers of appropriate size. This will include the proximal catheter, a valve or reservoir, and a distal catheter. The specimen should be collected into a clean, sterile, leakproof container. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.

Turnaround:	Prelim: 24 hours; Final: 48-72 hours, culture may be prolonged for fungal /anaerobic investigation if required (up to 5 days).
Ref. Range:	If pus is clearly seen, a Gram stain is performed. In the absence of a concurrent CSF and if there is sufficient CSF visible in the shunt tubing or reservoir the numbers of WBCs/cmm and RBCs/cmm are reported. Culture: Any clinically significant isolate with the appropriate sensitivities.

Cerebrospinal Fluid (CSF) – Spectrophotometry (Xanthochromia)

Laboratory:	Clinical Biochemistry
Specimen:	1.0 mL CSF specimen
Comment:	Sample must be light protected. Please use the specific request form.
Turnaround:	24 hours (weekdays only)
Ref. Range:	Ring laboratory for interpretation

Ceruloplasmin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in a plain tube (clotted sample).
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cervical Swab for Microbiology

Refer to Genital swab

Chikungunya Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	By arrangement
Report:	Qualitative result

Chlamydia trachomatis

Laboratory: Microbiology

Specimen: Nucleic acid amplification method. Appropriate PCR STD Specimen Collection and Transport Kits must be used. Please read the kit insert for information on specimen collection and associated limitations.

Comment: Test available Monday to Friday 9-5pm.

The assay is verified for use with female Endocervical swab specimens, High Vaginal Swab specimens and male/female Urine specimens. (These specimens will also be tested for *Neisseria gonorrhoea* DNA).
The preferred specimen type for Chlamydia testing in female patients is urine due to increased sensitivity and fewer problems during specimen processing.
Underfilled or overfilled Urine specimen containers are unsuitable for testing.
Endocervical/HVS specimen tubes with no swab or with two swabs cannot be tested.
Use only flocked swabs for Endocervical sampling (this is the thinner of the 2 swabs in the sample collection kit). Woven swabs from Endocervical sites are not processed.
Use woven swabs provided for all other sites, other than Endocervical sites
Specimens that appear bloody or have a dark brown colour are unsuitable for testing (may give false negative results).
The presence of mucous may inhibit PCR and cause false negative test results. Mucous free specimens are required for optimal test performance.
Do not use collection devices beyond their expiry date.

Turnaround: 96 - 120 hours

Report: RT: PCR *Chlamydia trachomatis* Target Not Detected or Target Detected
A Target Not Detected result does not automatically exclude infection from Chlamydia trachomatis as the level of DNA present may be lower than the limit of detection of the assay.
The assay is only verified for use with female Endocervical/HVS swab specimens and male/female Urine specimens. Results from other specimen types should be interpreted with caution.

Chloride (Blood)

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain tube (clotted sample)

Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Chloride (Urinary)

Laboratory: Clinical Biochemistry

Specimen: Spot or 24 Hr sample

Turnaround: 1 Day

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cholesterol

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain tube (clotted sample)

Comment: Fasting sample required

Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cholinesterase: Phenotyping And Genotyping

Laboratory:	Sample referred from Clinical Biochemistry to, Cholinesterase Investigation Unit, Department of Clinical Biochemistry, North Bristol NHS Trust, Southmead Hospital, Bristol BS10 5NB,UK
Specimen:	4.0 mL EDTA whole blood Sample should NOT be taken during Sux-induced after apnoea as the presence of the drug can lead to erroneously low enzyme activity. Test request should be delayed for 24 hours and for 6 weeks if fresh frozen plasma is administered.
Turnaround:	8 weeks
Ref. Range:	Contact Biochemistry (ext 22531)

Chromium & Cobalt (non-De Puy hips)

Laboratory:	Sample referred from Clinical Biochemistry to Trace metal laboratory, Guilford, Surrey
Specimen:	2 ml whole blood trace metal free bottle
Comment:	Fasting sample required
Turnaround:	6 weeks
Ref. Range:	See report or contact Trace metal laboratory, Guilford, Surrey 00-44-148 368 9978 (Technical & Clinical Queries)

Chromosome Analysis / Karyotype <18 years old

Laboratory:	Referred from Biochemical Genetics to Clinical Genetics at CHI Crumlin Patients <18yr. Referrals Mon-Thurs only.
Specimen:	Children (<18y): 3-5ml Lithium Heparin, at room temperature Infants: 1mL Lithium Heparin blood
Comment:	Consent form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Turnaround:	See website (TAT depends on priority/ 6weeks)
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Chromosome Analysis / Karyotype >18 years old

Laboratory:	Referred from Biochemical Genetics to the Doctor's Lab, London (TDL). Samples sent Mon-Thurs only.
Specimen:	Adults: 3mL Lithium Heparin blood
Comment:	Please use consent form available at https://www.tdlpathology.com/about-us/publications/ Please note: invoices issued directly to referring clinician.
Turnaround:	See website
Report:	Report sent to referring clinician and copy scanned to biochemical genetics

Citrate (Urinary)

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	24 hour urine, must be frozen < 30 minutes post collection
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site *https://www.eurofins.ie/biomnis/* for up to date referral test information.

CLIFT (Crithidia Luciliae Immuno Fluorescence Test)

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative immunofluorescent assay. Automatically checked following Positive Anti Nuclear Antibody assay showing a Homogenous ANA Patten of immunofluorescence. If CLIFT assay is positive a further quantitative Anti dsDNA Immunoassay is carried out.
Turnaround:	72 Hours
Ref. Range:	Not applicable

Clostridioides difficile Testing

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	Fresh faeces specimen. 1-2g (1-2mL) is sufficient.
Comment:	A molecular diagnostic assay is used for the direct qualitative detection of *Clostridioides difficile* toxin B gene in human faeces samples. Test performed Monday to Friday. Testing on individuals from 3-16 years should be restricted but exceptions can be made where indicated by the Microbiology Medical team. Testing not recommended on children <2. Requests for C. difficile are performed on inpatients, healthcare-associated and community individuals where the specimen takes the shape of the container and also on contacts during an outbreak. Repeat testing is not routinely performed on specimens positive or negative within the last 21 days except by prior approval with the Microbiology Medical team. Test of cure is not recommended. Specimens should be sent to the laboratory as soon as possible after collection for testing. If there is a delay in transit specimens should be stored in a refrigerator at 2-8°C, and tested within 72 hours. Samples greater than 3 days old on receipt in the laboratory are unsuitable for testing.
Turnaround:	Within 24 hours if received between Monday and Thursday; specimens received on Friday after 11:30am should be reported before 5 pm on the following Monday. Urgent specimens may be processed at weekends following consultation with the Microbiology Consultant. Positive reports are telephoned when available to the requesting area.
Report:	*C. difficile* toxin PCR target NOT detected/TARGET DETECTED. *C.difficile* Toxin testing carried out on all PCR TARGET DETECTED samples. A Target Not Detected result does not automatically exclude infection from *C. difficile* as the level of DNA present may be lower than the limit of detection of the assay.

CLL Prognostic Markers (*TP53* and *IGVH* mutation status)

Laboratory:	Referred from Haematology Dept to Royal Marsden Hospital UK
Specimen:	Blood 3 mL purple Vacuette (EDTA) 5 -10 mLs required and 3 mL green Vacuette (Lithium Heparin) Available Mon – Thurs, sample to reach Haematology Lab by 12 noon on day of sampling.
Comment:	Prognostic markers for CLL
Turnaround:	62 working days
Report:	Sent to referring clinician and copy filed in laboratory

Coagulation Factor VIII Inhibitors – Quantitation Assay

Laboratory:	Haematology
Specimen:	Blood 3mL x 2, blue Vacuette® (sodium citrate 3.2%). Specimens that are haemolysed, underfilled or overfilled cannot be analysed check coagulation sample bottles are not expired to ensure correct filling.
Comment:	Test available Monday to Friday, during routine working hours **by arrangement** with the Haematology dept. Quantitation of coagulation factor inhibitors reported in Bethesda Units. One Bethesda Unit is the amount of inhibitor in 1 mL of plasma that will neutralise 50% of the clotting factor activity. **Samples must be received within 4 hours of Phlebotomy**
Turnaround:	2 – 4 weeks
Report:	Negative Weak Factor Inhibitor: </= 10 BU/mL. Strong Factor Inhibitor: > 10 BU/mL.

Coagulation Factor Inhibitor Screen

Laboratory:	Haematology
Specimen:	Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%) Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment:	Demonstrates the inhibitory effect of Coagulation Factor antibodies. Test available Monday to Friday, during routine working hours **by arrangement** with the Haematology dept. See also Coagulation factor VIII Inhibitors – Quantitation Assay. **Samples must be received within 4 hours of Phlebotomy**
Turnaround:	Routine specimens: 2 weeks
Report:	Positive / Negative

Cocaine

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Coccidioides Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (UKHSA Mycology Reference Laboratory, Bristol)
Turnaround:	28 working days
Report:	Qualitative result

Coeliac Screen

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Includes IgA Anti-tTG plus IgA Anti-EMA if Anti-tTG Positive. IgA deficient sera automatically detected on Anti-tTG assay. Deficient sera are analyzed for total serum IgA. IgA deficient sera are tested for IgG Anti-EMA antibodies.
Turnaround:	24 Hours

Ref. Range: 0 - 5 AU/mL

Cold Agglutinins

Laboratory: Blood Transfusion Laboratory
Specimen: For Pre-Cardiac Surgery Patients: 1 x 6 ml EDTA Pink Capped Tube
For investigation of Cold Haemagglutinin Disease: 1 x 4 mL Clotted Sample (red cap/yellow ring tube) and 1 x 6 ml EDTA Pink Capped Tube BOTH brought to laboratory while still warm 37°C if possible.
Comment: This test is performed to detect cold agglutinins:
In Pre-Cardiac surgery patients at ambient room temperature (18-25°C).
In Cold Haemagglutinin Disease (CHAD).
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
NOTE: This is not an accredited test.
Turnaround: 8 Hours (Note: This may exceed 8 hours if positive for cold agglutinins)
Ref. Range: Not applicable

Conjunctivitis

See Eye Swab.

Continuous Ambulatory Peritoneal Dialysis Fluid

Laboratory: Microbiology (Main laboratory)
Specimen: Ideally, a volume of 20mL should be collected into a clean, sterile, leakproof container. In addition, blood culture bottles should be inoculated aseptically with 5-10mL of dialysate. Transport ASAP. If processing is delayed, refrigeration of the 20mL aliquot is preferable to storage at room temperature.
Comment: Test performed as an urgent specimen. If routine cultures are negative and abnormal dialysate findings persist, please discuss with the Microbiology medical staff. If mycobacterial culture is required it should be specifically requested.
Turnaround: Microscopy: 2 hours. Urgent report telephoned when available.
Prelim: 48 hours; Final: 5 days. Clinically significant isolates are telephoned when available.
Report: White cell count and aerobic culture. Where the white cell count is ≥50/cmm a Gram stain and white cell differential is performed.

Copper

Laboratory: Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford
Specimen: Sod Hep trace metal free tube (navy top)
Turnaround: 2 weeks
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Copper (Urinary)

Laboratory: Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford.
Specimen: 24 hr urine sample
Comment: Use acid-washed container only
Turnaround: 3 weeks
Ref. Range: Contact Clinical Biochemistry laboratory

Corneal Scrapings

See – Intraocular fluids /Corneal Scrapings

Cortisol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 3 Days

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cortisol-Salivary

Laboratory: Sample referred from Clinical Biochemistry to University Hospital of Wales, Cardiff
Specimen: Saliva collected in Salivette container
Comment: Time of sample must be recorded.
Turnaround: 5-6 weeks
Ref. range: See report form

Cortisol (Urinary)

Laboratory: Referred from Clinical Biochemistry to Biochemistry Laboratory in the Mater Hospital, Dublin.
Specimen: 24 Hour urine collection
Turnaround: 2 Weeks
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

COVID-19 (Molecular)

See section:
SARS CoV-2

***Coxiella burnetii* IgG and IgM (Q fever)**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Rare & Imported Pathogens Laboratory (RIPL), Porton Down)
Turnaround: 28 working days
Report: Qualitative result

Creatine Kinase (CK)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Creatinine (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Comment Estimated Glomerular filtration rate (eGFR) is available on request. Method adjusted 4-variable MDRD formula is used for calculation.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Creatinine (POCT)

Specimen: iStat Alinity for Creatinine is for use with **Adult samples only**.
Heparinised Arterial, Venous or Capillary Samples may be used.
Minimum sample volume = 65µL
Time to result: 2 minutes

Ref range:

Measured					
Test	Units	Reportable Range	Reference Range		
			Arterial	Venous	Critical
Creatinine	µmol/L	18-1768	53-115*	53-115*	≥ 300
eGFR	ml/min/1.73m²	n/a	n/a	n/a	≤ 30

Comment

Estimated Glomerular filtration rate (eGFR) is calculated using the UK-MDRD calculation.

NOTE: Alert/critical results must be confirmed with a venous sample. A venous sample must be taken by phlebotomy and sent to Biochemistry laboratory for determination of creatinine and eGFR. The venous result supersedes the capillary POC results and is used for clinical decision making. An eGFR <30 will require discussion with the team re prehydration or performing a non contrast study.

Creatinine (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 hour sample for creatinine clearance (Spot sample for microalbumin / creatinine ratio, see below)
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Creatinine Clearance

Laboratory: Clinical Biochemistry
Specimens: 4.0 mL blood in a plain tube (clotted sample) and a 24-hour urine sample.
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

CRP

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Comment: Only done when appropriate clinical details are provided.
This assay is not suitable for the stratification of risk of vascular disease.
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Cryoglobulin

Laboratory: Clinical Biochemistry (Immunology Laboratory)
Specimen: Blood must be collected into a gel-free, plain tube at 37 ^{O}C and 2 EDTA tubes and all sent to the lab in flask containing water heated to 37 ^{O}C.
Comment: Pre-arrange with Laboratory – Ext. 22535
Turnaround: 5 Days
Ref. Range: Cryoglobulin should be NEGATIVE

Cryptococcal Antigen –Blood sample

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Mycology Reference Centre, Bristol)
Turnaround: 28 working days
Report: Negative or Positive (Titre)

Cryptococcal Antigen –CSF sample

Laboratory: Microbiology
Specimen: CSF (0.3mL minimum)
Comment: Performed by a reference laboratory (Mycology Reference Centre, Bristol)
Turnaround: 28 working days
Report: Negative or Positive (Titre)

Cryptosporidium Species

Laboratory: Microbiology (Category 3 Laboratory)
Specimen: Faeces.
Performed routinely on all suitable faeces samples submitted for Routine Molecular Enteric Screening.
Other types of clinical specimen such as duodenal aspirates are also stained for cryptosporidia.
Comment: Test performed routinely Monday to Friday 9-5pm. Diagnosis is based upon the molecular detection of *Cryptosporidium parvum/hominis* and demonstration of oocysts in faeces samples using a modified Ziehl-Neelsen stain.
A Target Not Detected result does not automatically exclude infection from the above enteric pathogen as the level of DNA present may be lower than the limit of detection of the assay.
Turnaround: 36 hours.
Report: PCR for Cryptosporidium parvum/hominis: Target DETECTED or target NOT detected.
Oocysts of *Cryptosporidium* seen or not seen

CSF

See Cerebrospinal Fluid

CSF Oligoclonal bands and CSF IgG Index

See Cerebrospinal Fluid - Oligoclonal bands and CSF IgG Index

CSF Viral Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: CSF (>0.5mL)
Tests: Molecular tests for enterovirus, herpes simplex virus (HSV 1/2), varicella-zoster virus (VZV). For patients <3 years of age, human herpes virus 6 (HHV-6) and parechovirus are also included.
Comment: Testing performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround: 10 working days
Report: Detected or not detected

CSU - Catheter Urine

See Urine Microscopy and Culture

Cyclosporin (Neoral)

Laboratory: Clinical Biochemistry
Specimen: Trough sample required, (Blood 3mL, EDTA). Analysed on Thursdays
Turnaround: 7-8 days
Ref. Range: Patient specific Interpretation of Cyclosporin is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy and other drug therapy and method of measurement.

Cystic Fibrosis (CF)

Laboratory: Specimens referred from Biochemical Genetics to Clinical Genetics CHI
Specimen: Adults: 3-5 ml EDTA blood,
Infants: 1ml EDTA blood

Comment:	Request form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/ Please Note: Family predictive testing requires a Cystic Fibrosis Genetic Testing Questionnaire
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Cystine (WBC)

Laboratory:	Specimen are referred to CHI Temple Street (cell preparation) and then to Wellchild Lab (analysis)
Specimen:	3 ml Li-Hep whole blood.
Comment:	4-5 hours post Cystagon dose
Ref. Range	See report form

Cytogenetics (Chromosome banding) for the diagnosis of AML, CML, ALL and MDS

Laboratory:	Referred from Haematology to Munich Leukaemia Laboratory (MLL MVZ GmbH), Germany
Specimen:	5 ml **heparin** bone marrow
Comment:	Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround:	Up to 21 working days
Report:	Sent to referring clinician and copy filed in laboratory

Cytological Examination

Laboratory: Histopathology (Cytology Department)

Specimen: **Cerebrospinal Fluid (CSF) - Cytology**

See Cerebrospinal Fluid

Fine Needle Aspirate (FNAs)

An immediate fine needle aspiration service is available on request for both in-patients and out-patients. Aspirations are performed by a consultant Cytopathologist for palpable lesions. This can be arranged by discussion with the Laboratory (Ext.22511) or with the consultant (Ext.20499).

An FNA clinic accepting GP referrals for patients with palpable swellings is available on Thursday afternoons. A Consultant FNA Referral form needs to be completed and faxed/sent to the laboratory to arrange an appointment. This form is available in the CUH Staff Directory under CUH Forms or alternatively, by contacting 021 4922883/4922510.
Assistance to those performing FNAs in radiology is available before 4.30pm Monday to Friday. The service must be pre-booked with the Cytopathology laboratory @ Ext.22511.

Other Diagnostic Specimens

- Sputa – specimens are collected in sterile universal containers early morning on three consecutive days
- Bronchial samples, Serous fluids etc - all collected according to local protocols in sterile universal containers and transported to the laboratory as soon as possible. Protocols available from the cytology laboratory.
- Serous fluids; Ideally a minimum volume of 30 mLs. Please do not submit drain bags.
- Urines – specimens are collected into sterile universal containers.
- Joint fluid – see Joint Aspirate for Crystals.
- Cell fixative solution (Cytolyt) is available in Radiology and Endoscopy for fixing respiratory samples and samples taken out of hours where appropriate.

Comment:	Request form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/ Please Note: Family predictive testing requires a Cystic Fibrosis Genetic Testing Questionnaire
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Cytomegalovirus (CMV) IgG and IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	CMV IgM and CMV IgG antibodies are tested separately. The clinician must indicate the appropriate test by full history *etc*.
Turnaround:	36 hours
Report:	Qualitative result

Cytomegalovirus (CMV) Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL EDTA blood, urine, CSF, stool, pleural fluid, broncho-alveolar lavage, nasopharyngeal aspirate, blood spot (Guthrie card), amniotic fluid
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected (viral load) or not detected

Cytotoxic (Donor-specific) Antibodies

Laboratory:	Blood Transfusion Laboratory
Specimen:	5-10ml clotted blood (red top bottle)
Comment:	This test is carried out by Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.
Turnaround:	Contact Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.

D-dimers

Laboratory:	Haematology
Specimen:	Blood 3mL, blue Vacuette® (sodium citrate 3.2%) Specimens must be received within 24 hours of phlebotomy.
Comment:	The presence of cross-linked D-dimer domain is diagnostic for lysis of a fibrin clot. Test available Monday to Friday during routine working hours, and for emergency reasons at all other times.
Turnaround:	Emergency specimens: 3 hours; Routine specimens: 8 hours
Ref. Range:	Negative: 0 – 0.5 mg/L FEU Positive: > 0.5mg/L FEU

Dengue Virus IgG and IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Qualitative result

Dexamethasone Suppression Test

Laboratory:	Clinical Biochemistry
Specimen:	Serum sample
Comment:	Clearly indicate on form if patient is on dexamethasone.
Turnaround:	3 days
Ref. range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Dermatophytosis

See Mycology

DHEA Sulphate

Laboratory: Sample referred from Clinical Biochemistry to St. James's University Hospital, Leeds
Specimen: 2.0 mL blood in a plain tube (clotted sample)
Comment: Consultant request only
Turnaround: 4 weeks
Ref. Range: See report form

DHT (Dihydrotestosterone)

Laboratory: Sample referred from Clinical Biochemistry to St. James's University Hospital, Leeds
Specimen: 2.0 mL blood in a plain tube (clotted sample)
Comment: Consultant request only
Turnaround: 3 weeks
Ref. Range: See report form

Digoxin

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Samples for Digoxin must be taken at least 6 hours post dose. Range quoted is appropriate for a minimum 6 hours post dose sample.
Turnaround: 1 day, TAT for GP requests is 4 days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Diphtheria

Laboratory: Clinical Biochemistry
Specimen: Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment: Test performed by reference laboratory (Respiratory Infections Laboratory, Colindale, London).
Turnaround: 2-3 weeks
Report: Reported in anti-toxin levels – see specific laboratory report.

Direct Oral Anticoagulants- DOACs (Apixaban and Rivoroxaban)

Laboratory: Haematology
Specimen: Blood 3mL, blue Vacuette® (sodium citrate 3.2%)
Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct fill.
Comment: Used to monitor the edffectivenss of Apixaban and Rivoroxaban therapy.
It is essential to state the details of the type of Direct Oral Anticoagulant on request form.
Test performed by haematology consultant request only.
For accurate interpretation, it is important to know when the drug was last administered and the dose taken. A peak level should be taken 2-4 hours after the drug is taken and a trough level should be taken when the next dose of the drug is due.
Turnaround: 1 week.
Ref. Range: Refer to report.

Direct Coombs Test

Laboratory: Blood Transfusion Laboratory
Specimen: 3 mL Purple Capped (FBC) Tube.
For Paediatrics: 1 mL EDTA (Purple Cap/White Ring) Paediatric Bottle.

Comment: Investigation to demonstrate whether red cells are coated in vivo with immunoglobulins and/or complement.
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
This is an INAB accredited test.
Turnaround: 3 Hours
Ref. Range: Negative or Positive (IgG, IgA, IgM, C3c, C3d).

Direct Immunofluorescence – Renal Biopsy

See Renal Biopsy

Direct Immunofluorescence – Skin/Oral Mucosa

Laboratory: Histopathology (E.M Dept.)
Specimen: Fresh tissue in Michel's transport medium (Tissue fixative for immunofluorescence)
Comment: Fresh specimens are accepted Mon- Fri 8am to 3:30pm only.
Where a separate specimen from the same patient is taken for routine Histopathology, it should be delivered to the laboratory *with the specimen* for Direct Immunofluorescence.
Turnaround: 80% in 12 days

DNA JB9 Staining

Laboratory: Referred by Pathology to Charing Cross Hospital, London.
Specimen: 3 unstained tissue sections
Turnaround: 4 weeks

ds-DNA Elisa

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Quantitative Elisa. Quantitation of CLIFT Positive Anti-dsDNA sera.
Turnaround: 72 Hours
Ref. Range: 0 - 200 IU/mL

Duodenal Aspirate

Laboratory: Microbiology (Parasitology)
Specimen: Specimens will be obtained by specialist collection according to local protocols. The specimen volume may vary - ideally, a minimum volume of 1 mL should be sent to the lab. A screw-capped sterile universal container is practical for this purpose. Transport specimens ASAP. If processing is delayed do NOT refrigerate specimen, leave at room temperature. Delays of over 48h are undesirable.
Comment: Test performed Monday to Friday 9-5pm. Fluid from the duodenum is examined for the presence of *Strongyloides stercoralis* larvae, *Giardia lamblia* trophozoites, *Cyclospora*, and *Isospora belli*. Duodenal fluid is also examined for the presence of Microsporidia where specifically requested or where the patient is immunocompromised.
Turnaround: 24 hours. Microsporidia investigation referred to Reference laboratory. (turnaround time varies)
Report: Report on any parasites seen. Where possible the organism is reported to species level and the stage identified (trophozoite, cyst, oocyst, *etc*).

Dynamic Function Tests

Laboratory: Clinical Biochemistry
Specimen: Dependent on DFT requested, liase with Biochemistry Department
Comment: Prior arrangement with Biochemistry Department required
Turnaound: Within 24 hours
Report: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Ear Swab

Laboratory: Microbiology (Main laboratory)
Specimen: Swab any pus or exudate.
Comment: Test performed routinely Monday to Friday 9-5pm. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at room temperature. Tympanocentesis (needle aspiration) and Myringotomy (surgical incision of tympanic membrane), to specimen middle ear effusion, is rarely justified.
Turnaround: Prelim: 24 hours; Final: 48-72 hours
Report: Culture report: Any clinically significant isolate with the appropriate sensitivities.

Echinococcus (Hydatid cyst) Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround: 28 working days
Report: Qualitative result

***E. coli* 0157 Serology**

Test not available. Please refer to Faeces – Molecular Analysis and Culture.

***E. coli* PCR**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: CSF (0.5mL)
Comment: Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin
Turnaround: 10 working days. Samples received by IMSRL before 11am, verbal result between 4pm and 5pm the same day (positive only).
Report: Detected or not detected

EGFR, ALK, BRAF, KRAS, NRAS, PDL-1*, MMR/MSI, ERBB2, MET, NTRK 1, NTRK 2, NTRK 3, RET, ROS, Oncomine, MLH-1 Promoter Methylation studies, somatic Lynch Syndrome testing***.**

Laboratory: Molecular Pathology/Immunocytochemistry: Molecular testing in the Pathology laboratory CUH is performed on request from Consultant Histopathologists on FFPE tissue samples from patients with Lung cancer, Colon cancer and Melanoma. The current repertoire of tests includes, EGFR with reflex ALK, BRAF, KRAS, NRAS, PDL-1*, MMR/MSI, ERBB2, MET, NTRK 1, NTRK 2, NTRK 3, RET, ROS.
Specimen: FFPE tissue block
Turnaround: 5-10 working days
***** Some PDL-1 testing is referred to the Poundbury Cancer Institute, Dorset, if a different clone is required to the clone we use in-house Turnaround is 3 weeks.
****** Samples outside of the scope of in house NGS testing are referred to CMD, St James Hospital for Oncomine testing. Turnaround is 6 weeks.
*** MLH-1 Promoter Methylation studies are referred out to the Manchester Centre for Genomic Medicine. Turnaround is 11 weeks.

EGFR (cfDNA Plasma)

Laboratory: Molecular Pathology: EGFR cfDNA Plasma Molecular testing in the pathology laboratory CUH is performed on request from Consultant Histopathologists on plasma samples from patients with Lung cancer.
The cut-off for receipt of these samples into the laboratory is 15:00

Specimen: 2 K2 EDTA Blood tubes (must reach lab within 4 hours)
OR
at least 1 Roche cfDNA blood tube

Comment: Please contact the laboratory prior to taking the sample at Ext.22513 /22792
Once taken, deliver to the molecular pathology laboratory immediately and **hand directly to the Medical Scientist**.

Turnaround: 5-10 working days

Electron Microscopy

Laboratory: Pathology (E.M. Dept.)

Specimen: Fresh unfixed tissue, nasal brushings in 3% glutaraldehyde and neuropathology specimens (in-house and referral) in Karnovsky's fixative. (For renal biopsies see Renal Biopsy)

Please contact the laboratory in advance of the procedure at Ext. 21315 to organise collection of appropriate specimen container and fixative.

Tissue samples for EM should be brought immediately to the laboratory and **handed directly to a Medical Scientist.**

Note: For PCD specimens, the clinicians collect the appropriate fixative from the laboratory staff in the EM lab.

Comment: Specimens are accepted Mon – Fri 8am to 3:30pm

Turnaround: 3-5 working days renal biopsy

5-7 working days in-house muscle biopsy

5-7 working days in-house nerve biopsy

14 working days samples referred from CUH Neuropathology

12 weeks PCD samples (referred by EM Dept CUH to Primary Ciliary Dyskinesia (PCD) Diagnostic Service, University Hospital Southampton)

EMA (Endomysial Antibodies)

Laboratory: Autoimmune Serology

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Comment: Immunfluorescence test using Primate Oesophagus as substrate.
Part of Coeliac Screen. Confirmatory assay following Positive IgA Anti-tTG screen.

Turnaround: 24 Hours

Ref. Range: Not applicable

Erythrocyte Membrane Analysis EMA for Hereditary Spherocytosis

Laboratory: Specimen referred from Haematology to Haematology, Our Lady's Hospital Crumlin, Dublin 12

Specimen: Blood 3mL, purple, Vacuette® (EDTA)
Available Mon to Thurs only, to reach laboratory by 12 noon, Time of phlebotomy must be stated on form.

Comment: Requested by Consultant Haematologist

Turnaround: 28 working days

Report: Sent to referring clinician and copy filed in laboratory

ENA Screen (Extractable Nuclear Antigens)

Laboratory: Autoimmune Serology

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Comment: Qualitative Immunoassay using Phadia Unicap 250 analyser. Screening assay for antibodies to Ro, La, U1RNP, Sm, SCL-70 & Jo-1. Undertaken on all positive ANF sera.

Turnaround: 72 Hours

Ref. Range: Not applicable

Endocervical Swab

Refer to Genital swab

***Enterobius vermicularis* (Sellotape slide for Pinworm)**

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	The specimen is collected first thing in the morning, before the patient has bathed or used the toilet. Apply sellotape to the perianal region, pressing the adhesive side of the tape firmly against the left and right perianal folds several times. Smooth the tape back on the slide, adhesive side down. The sellotape slide should be kept in a slide box in a sealed plastic bag. It is recommended that samples should be taken for at least 4-6 consecutive days.
Comment:	Test performed routinely Monday to Friday 9-5pm. Transport specimens ASAP. Do not refrigerate or incubate specimens. Occasionally, an adult worm may be collected from a patient and should be sent in saline or water in a sterile leak-proof universal container for identification.
Turnaround:	24 hours
Report:	Enterobius vermicularis ova present **or** Enterobius vermicularis adult worm present

Enterovirus Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Faeces (2-5g), viral throat swab, CSF (>0.5mL), vesicular fluid, 4mL clotted blood, 4mL EDTA blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Samples positive in enteroviral screen are further tested to determine enterovirus type, which includes echovirus and coxsackie virus. A throat swab is requested for CSF samples positive for enterovirus RNA so that characterisation can be carried out.
Turnaround:	14 working days, additional time required for positive samples
Report:	Detected (with characterisation) or not detected

Epstein-Barr Virus (EBV) IgG and IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours for EBV IgM, 3 working days for EBV IgG
Report:	Qualitative result

Epstein-Barr Virus (EBV) Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL EDTA blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected (viral load) or not detected

Erythropoietin

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	Lithium Heparin or plain tube (clotted sample)**.**
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site https://www.*eurofins.ie/biomnis/* for up to date referral test information.

ESR Erythrocyte Sedimentation Rate

Laboratory: Haematology

Specimen: Adult sample: Blood 3mL purple Vacuette® EDTA (purple top), Minimum volume of sample required for ESR is 1.4 mL.
Paediatric sample: 2 x 1ml EDTA (Purple Cap/White Ring) or 2 x 1.3 ml (red top)

Comment: ESR Measurement is a non-specific test of inflammation and tissue damage.
Test available Mon to Fri during routine working hours.
ESR is most accurate when analysed within 4 hours of phlebotomy.

Turnaround: Urgent specimens: <2 hours (when laboratory informed);
Routine ward specimens: 8 hours, GP Specimens: 2 days

Ref. Range: Males: 0 – 10mm/ hour Females: 0 – 20mm/hour

Eye Swab

Laboratory: Microbiology (Main laboratory)

Specimen: Culture both eyes with separate swabs. Any available pus should be sampled as well as the area of interest. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature. Please indicate if testing for *Neisseria gonorrhoeae* is required. Specific Viral or Chlamydia swabs in appropriate transport media are needed for the diagnosis of viral and chlamydial infections.

Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.

Turnaround: Prelim: 24 hours; Final: 48-72 hours.

Report: Culture report: Any clinically significant isolate with the appropriate sensitivities.

Factor I (see Fibrinogen)

Laboratory: Haematology

Factor II – see also INR Prothrombin Time

Laboratory: Haematology

Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).

Comment: Determines the activity of coagulation Factor II (Prothrombin).
Test available Monday to Friday, during routine working hours.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.48	0.26 – 0.70
Day 5	0.63	0.33 – 0.93
Day 30	0.68	0.34 – 1.02
Day 90	0.75	0.45 – 1.05
Day 180	0.88	0.60 – 1.16

Adult – see final report

Factor V (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor V. Test available Monday to Friday, during routine working hours, **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day1	0.72	0.36 – 1.08
Day 5	0.95	0.45 – 1.45
Day 30	0.98	0.62 – 1.34
Day 90	0.90	0.48 – 1.32
Day 180	0.91	0.55 – 1.27
Adult	1.06	0.62 – 1.50

Factor V Leiden Mutation (G1691A)

Laboratory: Haematology Molecular Genetics

Specimen: Blood 3mL x 2 purple Vacuette® (EDTA) N.B. Separate EDTA sample necessary if FBC also requested, citrate specimen also required for APC Resistance

Comment: If the APC Resistance screening test for Factor V Leiden (which forms part of the thrombophilia screen) is positive it is confirmed by PCR analysis in the Haematology Genetics laboratory.
See Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.

Turnaround: 6 – 8 weeks

Report: (Negative/Positive-Heterozygous /Homozygous), see final report

Factor VII (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor VII. Test available Monday to Friday, during routine working hours, **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.66	0.28 – 1.04
Day 5	0.89	0.35 – 1.43
Day 30	0.90	0.42 – 1.38
Day 90	0.91	0.39 – 1.43
Day 180	0.87	0.47 – 1.27
Adult	1.05	0.67 – 1.43

Factor VIII (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor VIII. Test available Monday to Friday by arrangement, during routine working hours, emergency requests out of routine hours always requires prior Haematology Consultant approval and planning.
Samples must be received within 4 hours of phlebotomy

Turnaround: Emergency specimens < 4hours;
Routine specimens 14 days.

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	1.14	0.50 – 1.78
Day 5	1.02	0.50 – 1.54
Day 30	1.03	0.50 – 1.57
Day 90	0.87	0.50 – 1.25
Day 180	0.79	0.50 – 1.09
Adult	0.99	0.50 – 1.49

Factor VIII Chromogenic (Coagulation/clotting factor)

Laboratory: Referred from Haematology to National Coagulation Laboratory, St James Hospital, Dublin 8 (Paediatric samples are referred to Haematology Dept., Our Lady's Hospital , Crumlin, Dublin 12)

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: By arrangement with laboratory
Samples must be received within 4 hours of phlebotomy

Turnaround: 84 working days

Ref. Range: Adults (>18 years) 0.55 – 1.77 IU/ml

Report: Sent to referring clinician and copy filed in laboratory

Factor VIII Chromogenic

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor VIII. Test available Monday to Friday by arrangement, during routine working hours, emergency requests out of routine hours always requires prior Haematology Consultant approval and planning.
Samples must be received within 4 hours of phlebotomy

Turnaround: Emergency specimens < 4hours;
Routine specimens 14 days.

Ref. Range: 0.72 – 1.61 IU/ml

Factor IX (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor IX. Test available Mon to Fri, during routine working hours and for emergency reasons **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: Emergency specimens < 24hours (by arrangement);
Routine specimens: 2 weeks.

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.53	0.15 – 0.91
Day 5	0.53	0.15 – 0.91
Day 30	0.51	0.21 – 0.81
Day 90	0.67	0.21 – 1.13
Day 180	0.86	0.36 – 1.36
Adult	1.09	0.55 – 1.63

Factor X (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor X. Test available Monday to Friday, during routine working hours, **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.44	0.21 – 0.68
Day 5	0.49	0.19 – 0.79
Day 30	0.59	0.31 – 0.87
Day 90	0.67	0.35 – 0.99
Day 180	0.71	0.35 – 1.07
Adult	1.11	0.70 – 1.52

Factor XI (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor X1 Test available Mon to Fri, during routine hours, **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.38	0.10 – 0.66
Day 5	0.55	0.23 – 0.87
Day 30	0.53	0.27 – 0.79
Day 90	0.69	0.41 – 0.97
Day 180	0.91	0.49 – 1.34
Adult	0.97	0.67 – 1.27

Factor XII (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Determines the activity of coagulation Factor X11. Test available Mon to Fri, during routine hours, **by arrangement** with the Haematology Laboratory.
Samples must be received within 4 hours of phlebotomy

Turnaround: 2 weeks

Ref. Range:

Age	Mean (IU/mL)	Range (IU/mL)
Day 1	0.53	0.13 – 0.93
Day 5	0.47	0.11 – 0.83
Day 30	0.49	0.17 – 0.81
Day 90	0.67	0.25 – 1.09
Day 180	0.77	0.39 – 1.15
Adult	1.08	0.52 – 1.64

Factor XIII (Coagulation/clotting factor)

Laboratory: Haematology

Specimen: Blood 3mL x 2; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: A qualitative assay to diagnose congenital deficiency. Test available Mon – Thurs,(due to incubation requirements) during routine hours.
Samples must be received within 4 hours of phlebotomy

Turnaround: 3 weeks

Ref. Range: Normal/Abnormal clot detected, Low level detected

Faecal Elastase

Laboratory: Referred from Biochemistry to City Hospital, Birmingham

Specimen: Minimum 5g stool

Turnaround: 2 Weeks

Ref. Range: See report form

Faeces – Molecular Analysis and Culture

Laboratory: Microbiology (Category 3 Laboratory)

Specimen: Faeces sample for molecular analysis of *Salmonella* spp., *Shigella* spp., *Campylobacter* spp. Verotoxin (VT1 and / VT2; markers of enterohaemorrhagic disease), *Cryptosporidium parvum/hominis* and *Giardia lamblia*.
The specimen should be collected into a clean, sterile, leakproof container. Ideally, all specimens should be taken as soon as possible after onset of symptoms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. A number of important pathogens such as *Shigella* species may not survive the pH changes that occur in faeces specimens that are not promptly delivered to the laboratory, even if refrigerated.
Samples >72hrs old on receipt in the laboratory are unsuitable for testing.
Hospital inpatient samples are not routinely retested for 14 days if they are continually in hospital for this period.

Comment: Rectal swabs are not suitable. Full clinical information should be provided, esp. presence and duration of symptoms, recent foreign travel or shellfish ingestion and previous antibiotics.
Clearance samples for Salmonella, Shigella and Campylobacter not routinely processed unless clinically indicated. Please discuss with Microbiology Medical team.

Turnaround: <36hours for preliminary result
Clinically significant isolates are telephoned when available.
Confirmatory culture results are sent to referral labs and may take up to 4 weeks

Report: Report presence of specific pathogen and absence of other pathogens (Target Not Detected or Target Detected). Faeces are cultured on selective media for *Salmonella and Shigella* when positive by molecular testing. Verotoxigenic positive samples are sent to Cherry Orchard Reference laboratory for confirmation.
In addition, when clinically indicated, specific media for *Yersinia* spp. And *Vibrio* sp will be inoculated. Where appropriate i.e. HUS the specimen is sent to Cherry Orchard Hospital lab for detailed analysis of various enterohaemorrhagic *E. coli*

A Target Not Detected result does not automatically exclude infection from the above enteric pathogens as the level of DNA present may be lower than the limit of detection of the assay.

Please refer to individual sections for *Clostridioides difficile* testing, *Cryptosporidium Sp.* Parasitology and Rotavirus /Adenovirus antigens.

Fallopian Tube Aspirate / Tubo-ovarian Fluid

See Sterile Body Fluid – Microscopy and Culture.

Fanconi's Anaemia Chromosome Breakage

Laboratory: Referred from Biochemical Genetics to Bristol Genetics Lab
Specimen: 5ml Lithium Heparin blood/bone marrow
Paediatrics – at least 1ml lithium heparin (preferably 2ml)
Comment: Minimum of 24hr notice required to facilitate courier arrangements (Contact ext 22531). Request forms available at www.nbt.nhs.uk/genetics
Turnaround: See website

Farmer's Lung Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround: 28 working days
Report: Quantitative result with an interpretative comment

Ferritin

Laboratory: Haematology
Specimen: Blood 4mL Red Vacuette® (clotted blood).
Comment: The level of serum ferritin correlates well with the body iron reserves under various physiological and pathological conditions. Ferritin is an acute phase reactant.
Test available Monday to Friday, during routine working hours. Exceptions to this may be available for Covid 19 screening with prior arrangement.
Ferritin should be requested for investigation of abnormal FBC results and relevant clinical syndromes.
Use of haematinics for screening of well patients is not recommended. Requests should be accompanied by clinical details.
See BCSH guidelines.
Laboratory Diagnosis of Functional Iron Deficiency
http://onlinelibrary.wiley.com/doi/10.1111/bjh.12311/pdf
Turnaround: 7 working days
Ref. Range: Females 11 – 307 ng/ml, Males 23.9 – 336.2 ng/ml
These are ADULT ranges – for guidance only

Fertility Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood

Tests: Hepatitis B surface antigen, anti-HBcore, HIV Ag/Ab, anti-HCV

Turnaround: Negative samples: 36 hours. Please allow extra time for samples testing positive in house for HIV Ag/Ab and anti-HCV (external confirmatory testing required).

Report: Qualitative result

Fibrinogen (Factor 1)

Laboratory: Haematology

Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling)
Specimens must be received within 12 hours of phlebotomy.

Comment: Determines the concentration of plasma fibrinogen. Forms part of a Thrombophilia and/ or Lupus screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia. Test available Monday to Friday, during routine working hours, and for emergency reasons at all other times.

Turnaround: Emergency specimens: 2 hours by arrangement with the laboratory; Routine specimens: 8 hours, if part of Thrombophilia 3 – 4 weeks

Ref. Range:

Age	Mean(g/L)	Range g/L
Day 1	2.9	1.7 – 4.0
Day 5	3.2	1.6 – 4.7
Day 30	2.7	1.6 – 3.8
Day 90	2.5	1.1 – 3.8
Day 180	2.6	1.2 – 3.9
Adult	2.9	1.7 – 4.1

Fibrinogen Phenotyping and Genetic Analysis

Laboratory: Sample referred from Haematology to the DNA Laboratory, St., Thomas's Hospital, London

Specimen: Blood 3 mL purple Vacuette® (EDTA) and Blood 3ml; blue Vacuette® (sodium citrate 3.2%), fill to mark on tube.

Comment: Request must be booked in advance with the Haematology Laboratory CUH, performed in the investigation of Dysfibrinogenanaemia

Turnaround: 80 working days

Report: Sent to referring clinician and copy filed in laboratory

Filaria Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Comment: Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 28 working days

Report: Qualitative result

Fluroesence/Chromogenic In-Situ Hybridisation (FISH/CISH) (Tissue)

Laboratory: Referred by Pathology to CMD, St James Hospital.

Specimen: FFPE tissue block

Comment: See St.James Lab User Handbook (available online) for available targets.

Turnaround: 5 weeks

Fluoresence In-Situ Hybridisation FISH, for the diagnosis of AML, CML, ALL, MDS, Multiple Myeloma, Plasmocytoma.

Laboratory:	Referred from Haematology to Munich Leukaemia Laboratory (MLL MVZ GmbH), Germany
Specimen:	2-3 ml bone marrow aspirate or peripheral blood are sufficient in case of normal cellularity
Comment:	Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround:	Up to 21 working days (excluding transport time)
Report:	Sent to referring clinician and copy filed in laboratory

Fluoresence In-Situ Hybridisation (FISH) for postnatal/microarray follow-up

Laboratory:	Specimens referred from Biochemical Genetics to Clinical Genetics CHI
Specimen:	Adults: 2ml Lithium Heparin. Infants: 1ml Lithium Heparin at room temperature
Comment:	Request form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Turnaround:	See CHI Crumlin website
Report:	Sent to referring clinician and copy scanned to biochemical genetics.

Flow Cytometry

Laboratory:	Haematology
Specimen:	Fresh Blood or Bone Marrow – 3mL, purple Vacuette (EDTA). Samples may be refrigerated overnight. Optimal sample age less than 24 hours **of phlebotomy**. Cerebrospinal fluid (CSF)- CSF collection bottles containing transfix are stored in the haematology laboratory. Test performed only by prior arrangement with laboratory. Once the CSF is added the samples are to be sent directly to the haematology laboratory
Comment:	All Flow cytometry samples must be transported directly to the laboratory immediately. Used as a diagnostic tool in identifying leukaemias. Test available Mon to Fri, during routine hours by arrangement with the Haematology laboratory. Please state specimen type on form, it is essential to provide relevant essential clinical information. Should be requested on the advice of a consultant haematologist. **NB:** CSF Immunophenotyping is for diagnosis of primary CNS lymphoma or CNS involvement by Leukaemia/ lymphoma only. Samples from patients with non-haematological diagnoses will not be tested. CSF samples for flow cytometry must be taken directly into Transfix collection bottles. CSF samples are extremely labile and samples not received in transfix will not be processed if greater than 1 hour old irrespective of Microbiology or Cytology cell counts For new acute leukaemias presenting out of hours and at weekends, where the timely commencement of appropriate therapy may rely on a diagnostic flow report, the Consultant Haematologist will liaise with Flow Cytometry staff to facilitate such requests.
Turnaround:	Routine specimens: 72 hours Urgent specimens: 24 hours
Ref. range:	Refer to final report
Report:	Sent to referring clinician and available on iLab

Foetal Genotype

Laboratory:	Available by prior arrangement with Blood Transfusion Laboratory
Specimen:	16mL EDTA maternal 3mL EDTA paternal

Comment:	If possible, 24 hours notice to Blood Transfusion Laboratory, CUH required (Contact Ext 22537) IBGRL Request Form F014 to be completed by requesting clinician (Available from Blood Transfusion Laboratory). Samples referred to: IBGRL, Bristol, United Kingdom via IBTS. NOTE: Foetal Sex Typing is NOT referred by the Blood Transfusion Laboratory, CUH.
Turnaround:	21 Working Days

Foetal DNA Rh D Screen

Laboratory	Blood Transfusion
Specimen:	1 x 6ml EDTA
Comment:	This test available since 18/06/18. Performed by a reference laboratory (International Blood Grouping Reference Laboratory, Bristol, UK) Minimum gestation 11 weeks + 2.
Turnaround:	3 weeks
Ref. Range:	Rh D Positive; Rh D Negative; Rh D Inconclusive

Flecanide

Laboratory:	Referred from Clinical Biochemistry to ASI, St George's University Hospital, London.
Specimen:	Serum (Trough sample)
Comment:	Toxicity may occur at levels >700mg/L. Range quoted is appropriate for a trough sample.
Turnaround:	4 weeks
Therapeutic Range:	See report form

Foetal Maternal Haemorrhage FMH by Flow Cytometry ≥4 mls bleed

Laboratory:	Referred by Haematology to the Rotunda Hospital, Parnell St, Dublin 1
Specimen:	3ml EDTA specimen
Comment:	All postnatal samples with bleeds ≥4mls are referred to the Rotunda for flow cytometry. Antenatal patients with bleeds ≥4mls are NOT referred. Flow cytometry in Rotunda is currently not validated for antenatal patients. Kleihauer on a rhesus D Neg mother of a baby with a weak D Ag are NOT referred.
Turnaround:	14 working days for the hard copy report: It is practice of the referral
Report:	laboratory to give a verbal report as soon as possible. Sent to clinician and copy filed in laboratory

Foetal Sex Typing

Laboratory:	Referred from Biochemical Genetics to IBGRL, Bristol. Prior notice required to facilitate courier arrangements (Contact ext 22531)
Specimen:	16mL EDTA maternal 3mL EDTA paternal
Comment:	Pregnancy must be at least 7 weeks Request from (FM4674) at https://www.nhsbt.nhs.uk/ibgrl/services/molecular-diagnostics/fetal-genotyping-diagnostic/
Turnaround:	See website

Foetus – First Trimester

Laboratory:	Histopathology (Diagnostic Laboratory)

Comment: If pre-viable foetal tissue (however small) is identified following delivery, the *Consent to Pathological Examination of a pre- 16 week foetus* form (form 453) must be completed in full by the doctor or midwife, signed by the parent , and submitted to the Histopathology laboratory with a completed Histopathology Request Form. For full details of the protocol contact the Histopathology laboratory at (021) 4922792

Foetus – Post First Trimester

See Autopsies/Post-Mortems under HISTOPATHOLOGY

Folate (serum)

Laboratory: Haematology

Specimen: Blood 4mL Red, Vacuette® (clotted blood).

Comment: Forms part of the investigation of Megaloblastic Anaemia.
Please note that international studies have indicated that folic concentrations < 4 ng/mL may be associated with deficiency. Therefore results < 4 ng/mL should be subject to clinical as well as laboratory interpretation.
Test available Monday to Friday, during routine working hours.
B12 and Folate should be requested for investigation of abnormal FBC results and relevant clinical syndromes.
Use of haematinics for screening of well patients is not recommended. Requests should be accompanied by clinical details.
See BCSH guidelines.
The diagnosis of B12 and folate deficiency
http://onlinelibrary.wiley.com/doi/10.1111/bjh.12959/pdf

Turnaround: 7 working days

Ref. Range: 3.1 – 20 ng /mL
These are ADULT ranges – for guidance only

Formalin Fixed Histopathology Specimens

Laboratory: Histopathology

Specimen: Formalin fixed Tissues for Histopathology
See separate entries for
- Direct Immunofluorescence
- Skin/Oral mucosa,
- Electron Microscopy,
- Frozen Sections,
- Liver Biopsy for Copper/Iron Estimation,
- Renal Biopsy

Comment: Specimens should be placed in a container, large enough to contain adequate Buffered Formalin for fixation (recommend ratio of at least 2:1 for Buffered Formalin volume: specimen size). Ideally all specimens should be submitted intact to allow accurate gross examination. ***Tissue should not be removed from the specimen, for research purposes or otherwise, without prior consultation with a Pathologist as this may compromise accurate diagnosis***. ***Where specimens are orientated by/with sutures etc, their designation should be clearly detailed on the accompanying Request Form.***
Pathologists are available for discussion of Histopathology cases, both pre and post receipt within the laboratory.
Urgent Specimens: Where case is deemed urgent by the clinician, this must be clearly indicated on the Request Form.
The Histopathology laboratory does not operate an out-of-hours service. However a consultant pathologist is on-call and may be contacted through the main hospital switchboard, Ph. 021-4922424/4922100

For special Consideration

- ***Breast Needle Core Biopsy Calcified and Non-Calcified*.** Immediately place in Buffered Formal Saline and please state date and time specimen taken. To facilitate subsequent microscopic location of calcified deposits, breast needle core biopsies should be divided into calcified and non-calcified cores when the biopsies are taken.
  Note: A separate form is required for biopsies taken from the right and left side. Non-calcified cores should be placed in yellow mesh cassettes which are then placed into a labelled Formalin pot. Calcified cores should be placed in orange mesh biopsy cassettes which are which are then placed into a labelled Formalin pot.
- ***Cardiothoracic specimens*** must be delivered directly to the Histopathology Laboratory reception without delay. Prolonged fixation may adversely affect subsequent laboratory test results.
  Optimal fixation times:
  - Small biopsy samples – 6 - 12 hours
  - Larger surgical specimens - 8-18 hours.

  Lung resection specimens are inflated upon receipt to assist penetration of fixative; delay in delivery adversely affects inflation and fixation.
- ***Placenta:*** With complicated monochorionic twins where injection studies might be required please discuss with the Histopathology Laboratory before putting placenta into Formalin.
- **Products of Conception:** The 'Fetal Tissue in early pregnancy loss' information leaflet (EXT-CUH-PATH-1201) should be provided to the patient when products of conception tissue is sent to pathology.
- **Renal Biopsy:** See separate entry for Renal biopsy

Turnaround: The Histopathology NQI Programme divides Histopathology specimens into 4 categories within which TATs are analysed.

		NQI Target TAT
P01	small biopsies	80% in 5 working days
P02	GI biopsies	80% in 7 working days or 100% in 10 working days
P03	Cancer resections	80% in 7 working days
P04	Non-Cancer resections	80% in 7 working days

Our aim is to meet the NQI target TATs for all **urgent** cases.
For routine cases, we have subcategorised specimens according to speciality.

Presently the Histopathology Department are not meeting the NQI Target TAT for some routine cases. A realistic CUH Target TAT has been published in the table below. A process is in place to address the staffing and resource deficits in the laboratory as we work towards achieving NQI Target TAT for all sample types.

Type	P Code	NQI TAT (working days)*	CUH TAT (working days)*
Breast	P01	5	5
	P03	7	7
	P04	7	7
GIT biopsies	P02	7	13
		10	10
Upper GIT	P01	5	7

	P03	7	12
	P04	7	13
Lower GIT	P03	7	12
	P04	7	12
Skin	P01	5	14
	P03	7	12
	P04	7	12
Cardiothoracic	P01	5	5
	P03	7	10
	P04	7	10
ENT	P01	5	10
	P03	7	13
	P04	7	11
Cervical cases	P01	5	10
	P04	7	14
Gynae cases	P01	5	12
	P03	7	10
	P04	7	12
PNP - POC and Ectopic Pregnancy related specimens	P04	7	8
PNP - Placenta	P04	7	40
Bone Marrow biopsy	P04	7	10
GU	P01	5	8
	P03	7	10
	P04	7	8
Prostate needle biopsy	P01	5	10

***Please Note:**
The following factors may impact stated TAT

- Requirement for ancillary testing to include levels, IHC, Special stains and Molecular Pathology
- Intradepartmental consultation
- Requirement for decalcification
- Large number of blocks required on case.
- Some larger specimens requiring longer fixation (48-72hrs)

Fragile X Syndrome (FRAX)

Laboratory:	Specimens referred from Biochemical Genetics to Clinical Genetics CHI
Specimen:	Infant: 1ml EDTA & 1ml Lithium Heparin bloods Adults: 3-5mls EDTA & 2mls Lithium Heparin bloods
Comment:	Request form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Turnaround:	See CHI Crumlin website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Francisella tularensis Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (Rare & Imported Pathogens Laboratory (RIPL), Porton Down)
Turnaround:	28 working days
Report:	Qualitative result

Serum Free Light Chains (SFLC)-Kappa and Lambda

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube
Comment: Contact Immunology on Ext. 22535 if Urgent Free Light Chain required.
Turnaround: 10 days
Report: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Free Fatty Acids (FFA)

Laboratory: Sample referred from Clinical Biochemistry to the Department of Clinical Chemistry and Newborn Screening, Sheffield
Specimen: 1.2 ml Fluoride oxalate plasma
Turnaround: 4 weeks
Report: See report form

Free T4 (Thyroxine)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Free T3 (Triiodothyronine)

Laboratory Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Frozen Sections (Intraoperative Consultation-Urgent), Neurosurgery

Laboratory: Neuropathology
Specimen: Fresh tissue (universal precautions)
Comment Routine service is available 9:00am to 5:00pm Monday – Friday. Please refer to the protocol for frozen section (Neuropathology Department information for Users). Cases to be arranged between the Neurosurgeon and Neuropathologist. Please contact extension 22520. Theatre rings Neuropathology Department (ext 22519/22520) at the time the specimen is being sent. Theatre Nurse brings the specimen to Theatre Reception Area. Specimen is given to the Porter on Call, who signs the Specimen Book. The Porter brings the specimen in the appropriate container directly to a staff member in the Neuropathology Department.

Universal safety precautions must apply. Fresh nervous system tissue requires special precautions in high risk cases. These include suspected prion diseases, and other transmissible diseases e.g. tuberculosis, HIV. Label specimen container and request form with Biohazard sticker. Please contact the Neuropathologist on duty in advance.

Neuropathology Department logs receipt of the specimen and returns the box to the Porter.

An urgent on-call service is available outside of these hours on weekdays and a limited on-call at certain weekends only. Cases should be arranged in advance between the Neurosurgeon and the Neuropathologist on call (contact switch).

Turnaround: 20 minutes. Result is telephoned back to theatre.

Frozen Sections – Urgent

Laboratory:	Histopathology (Diagnostic Laboratory)
Specimen:	Fresh tissue
Comment:	The Frozen Section service is available ***Mon –Fri 8am to 4pm*** Outside of these hours if a frozen section is anticipated, the case must be discussed with a pathologist (after 5pm the case must be discussed with the pathologist on-call who may be contacted through the hospital switchboard). *If the fresh specimen poses a health risk to laboratory personnel (e.g. TB, HIV), frozen analysis should not be undertaken. Alternative approaches to rapid diagnosis may be discussed with Pathologist/Senior Medical Scientist.* Booking: Frozen sections Monday – Friday, should be booked in advance where possible (preferably 24hrs before elective surgery). The Histopathology laboratory should be contacted at ext. 22792 with the following details. Date and Time schedule / Patient name /Theatre /Surgeon / Specimen type. ***Note:*** if the frozen section is delayed or cancelled please notify the Histopathology laboratory at ext. 22792.
Transport:	Unfixed tissue for frozen section must be transported directly to the laboratory immediately in a correctly labelled dry container, accompanied by a completed Request Form and handed to a Medical Scientist, NCHD or Consultant Histopathologist in the Histopathology laboratory. The form must have a red Frozen sticker attached. Specimens from external hospitals must be transported according to UN3373 standards (triple packaging).
Turnaround:	20 minutes per frozen section. If multiple frozen sections are received, TAT will increase accordingly.

FSH

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Full Blood Count including automated WBC DifferentialBlood Films for Manual White Cell Differentials, Slide Platelets and Red Cell Morphology (peripheral blood smear)

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA) Paediatric (1mL purple (EDTA) or 1.3 mL red) Note: 6ml purple EDTA Vacuette or any other sample type is unsuitable for FBC. Blood Films are made in the laboratory as required.
Comment:	**Full Blood Counts:** Impedence /Fluorescence Flow Cytometry Technology. Test available Monday to Friday, during routine working hours and for emergency reasons at all other times. FBC performed in the investigation of anaemias, infections, leukeamias, platelet disorders and myeloproliferative disorders and also for the monitoring of therapies, e.g. nutritional, chemotherapy. **Manual differentials, slide platelets and red cell morphology** available when deemed necessary or when the laboratory is contacted by clinician. **Note:** NRBCs occur in peripheral blood in neonates and premature babies in low numbers as a normal finding. In healthy adults and older children, NRBCs are only found in bone marrow where they mature. Their appearance in peripheral blood points to extramedullary erythropoiesis or marrow stress with disruption of the blood-bone marrow barrier.[1] Results of NRBC count

must be interpreted in conjunction with the full clinical picture. The requesting clinician is responsible for evaluating the reported NRBC count and evaluating the presence of any NRBCs reported in the FBC in the light of the patients age and clinical details. *([1]Sysmex Xtra Online | March 2012 | The clinical relevance of measuring NRBC in the XN-CBC)*

Storage: If delays are unavoidable, samples can be preserved by refrigeration at 2-8°C in a designated specimen fridge.

Stability:

	Ambient Temperature	Refrigerated
WBC	36 hrs	56 hrs
RBC	48 hrs	72 hrs
HB	72 hrs	72 hrs
MCV	8 hrs	24 hrs
PLTS	48 hrs	48 hrs

Transport: Transport specimen to the laboratory at ambient temperature.

Turnaround: **Full Blood Counts:**
Emergency specimens < 2 hours.
Urgent specimens, i.e. received from wards with urgent label: 4 hours.
Routine in-hospital specimens: 8 hours
GP specimens: 2 days

Manual differentials, slide platelets and red cell morphology
Clinically significant: 4 hours
Routine specimens 48 hours

Ref. Range: Age and sex Related Reference Ranges

Analyte & units	Age	Sex	Range
Haemoglobin g/dl	0 minutes – 24 hours	Male	14.9-23.7
Haemoglobin	1 day – 14 days	Male	13.4 – 19.8
Haemoglobin	14 days – 2 months	Male	9.4-13.0
Haemoglobin	2 months – 6 months	Male	10.0-13.0
Haemoglobin	6 months – 12 months	Male	10.1 – 13.0
Haemoglobin	12 months – 6 years	Male	11.0 – 13.8
Haemoglobin	6 years – 12 years	Male	11.1 – 14.7
Haemoglobin	12 years – 18 years	Male	12.1 – 16.6
Haemoglobin	>18 years	Male	13.0 – 17.0
Haemoglobin	0 minutes – 24 hours	Female	14.9 – 23.7
Haemoglobin	1 day – 14 days	Female	13.4 – 19.8
Haemoglobin	14 days – 2 months	Female	9.4 – 13.0
Haemoglobin	2 months – 6 months	Female	10.0 – 13.0
Haemoglobin	6 months – 12 months	Female	10.1 – 13.0
Haemoglobin	12 months – 6 years	Female	11.0 – 13.8
Haemoglobin	6 years – 12 years	Female	11.1 – 14.7
Haemoglobin	12 years – 18 years	Female	12.1 – 15.1
Haemoglobin	>18 years	Female	11.7 – 15.9
Red cell count x 10^{12}/l	0 minutes – 24 hours	Male	3.7-6.5
Red cell count	1 day – 14 days	Male	3.9-5.9
Red cell count	14 days – 2 months	Male	3.1-4.3
Red cell count	2 months – 6 months	Male	3.8 – 4.9
Red cell count	6 months – 12 months	Male	3.9-5.1
Red cell count	12 months – 6 years	Male	3.9 – 5.0
Red cell count	6 years – 12 years	Male	3.9 – 5.2
Red cell count	12 years – 18 years	Male	4.2 – 5.6

Red cell count	>18 years	Male	4.2 – 5.6
Red cell count	0 minutes – 24 hours	Female	3.7-6.5
Red cell count	1 day – 14 days	Female	3.9-5.9
Red cell count	14 days – 2 months	Female	3.1- 4.3
Red cell count	2 months – 6 months	Female	3.8 – 4.9
Red cell count	6 months – 12 months	Female	3.9 – 5.1
Red cell count	12 months – 6 years	Female	3.9 – 5.0
Red cell count	6 years – 12 years	Female	3.9 – 5.2
Red cell count	12 years – 18 years	Female	4.1 – 5.1
Red cell count	>18 years	Female	3.9 – 5.3
White blood cell count x 10^9/l	0 minutes – 24 hours	All	10.0 – 26.0
WBCC	1 day – 14 days	All	6.0 – 21.0
WBCC	14 days – 2 months	All	5.0 – 15.0
WBCC	2 months – 6 months	All	6.0 – 17.0
WBCC	6 months – 12 months	All	6.0 – 16.0
WBCC	12 months – 6 years	All	6.0 – 17.0
WBCC	6 years – 12 years	All	4.5 – 14.5
WBCC	12 years – 18 years	All	4.5 – 13.0
WBCC	>18 years	All	4.4 – 11.3
Haematocrit l/l	0 minutes – 24 hours	Male	0.47 – 0.75
Haematocrit	1 day – 14 days	Male	0.41 – 0.65
Haematocrit	14 days – 2 months	Male	0.28 – 0.42
Haematocrit	2 months – 6 months	Male	0.30 – 0.38
Haematocrit	6 months – 12 months	Male	0.30 – 0.38
Haematocrit	12 months – 6 years	Male	0.32 – 0.40
Haematocrit	6 years – 12 years	Male	0.32 – 0.43
Haematocrit	12 years – 18 years	Male	0.35 – 0.49
Haematocrit	>18 years	Male	0.38 – 0.49
Haematocrit	0 minutes – 24 hours	Female	0.47 – 0.75
Haematocrit	1 day – 14 days	Female	0.41 – 0.65
Haematocrit	14 days – 2 months	Female	0.28 – 0.42
Haematocrit	2 months – 6 months	Female	0.30 – 0.38
Haematocrit	6 months – 12 months	Female	0.30 – 0.38
Haematocrit	12 months – 6 years	Female	0.32 – 0.40
Haematocrit	6 years – 12 years	Female	0.32 – 0.43
Haematocrit	12 years – 18 years	Female	0.35 – 0.44
Haematocrit	>18 years	Female	0.35 – 0.46
Mean Cell Haemoglobin pg	0 minutes – 24 hours	Male	30.0 – 37.2
MCH	1 day – 14 days	Male	30.0 – 37.2
MCH	14 days – 2 months	Male	27.0 – 36.0
MCH	2 months – 6 months	Male	24.0 – 32.2
MCH	6 months – 12 months	Male	24.0 – 29.6
MCH	12 months – 6 years	Male	25.6 – 30.7
MCH	6 years – 12 years	Male	26.3 – 30.9
MCH	12 years – 18 years	Male	26.9 – 31.9
MCH	>18 years	Male	26.0 – 34.0
MCH	0 minutes – 24 hours	Female	30.0 – 37.2
MCH	1 day – 14 days	Female	30.0 – 37.2
MCH	14 days – 2 months	Female	27.0 – 36.0
MCH	2 months – 6 months	Female	24.0 – 32.2
MCH	6 months – 12 months	Female	24.0 – 29.6
MCH	12 months – 6 years	Female	25.6 – 30.7
MCH	6 years – 12 years	Female	26.3 – 30.9
MCH	12 years – 18 years	Female	26.7 – 32.5
MCH	>18 years	Female	26.0 – 34.0

Mean Cell Haemoglobin Concentration g/dL			
MCHC	0 minutes – 24 hours	Male	28.1 – 34.7
MCHC	1 day – 14 days	Male	28.1 – 34.7
MCHC	14 days – 2 months	Male	28.1 – 35.5
MCHC	2 months – 6 months	Male	28.8 – 37.3
MCHC	6 months – 12 months	Male	32.1 – 37.4
MCHC	12 months – 6 years	Male	32.9 – 35.6
MCHC	6 years – 12 years	Male	32.7 – 35.7
MCHC	12 years – 18 years	Male	33.5 – 35.2
MCHC	>18 years	Male	31.0 – 37.0
MCHC	0 minutes – 24 hours	Female	28.1 – 34.7
MCHC	1 day – 14 days	Female	28.1 – 34.7
MCHC	14 days – 2 months	Female	28.1 – 35.5
MCHC	2 months – 6 months	Female	28.8 – 37.3
MCHC	6 months – 12 months	Female	32.1 – 37.4
MCHC	12 months – 6 years	Female	32.9 – 35.6
MCHC	6 years – 12 years	Female	32.7 – 35.7
MCHC	12 years – 18 years	Female	33.0 – 35.5
MCHC	>18 years	Female	31.0 – 37.0
Mean Cell Volume fl	0 minutes – 24 hours	Male	100-125
MCV	1 day – 14 days	Male	88 – 110
MCV	14 days – 2 months	Male	84 – 98
MCV	2 months – 6 months	Male	73 – 84
MCV	6 months – 12 months	Male	70 – 82
MCV	12 months – 6 years	Male	72 – 87
MCV	6 years – 12 years	Male	76 – 90
MCV	12 years – 18 years	Male	77 – 92
MCV	>18 years	Male	80 – 96
MCV	0 minutes – 24 hours	Female	100-125
MCV	1 day – 14 days	Female	88 – 110
MCV	14 days – 2 months	Female	84 – 98
MCV	2 months – 6 months	Female	73 – 84
MCV	6 months – 12 months	Female	70 – 82
MCV	12 months – 6 years	Female	72 – 87
MCV	6 years – 12 years	Female	76 – 90
MCV	12 years – 18 years	Female	77 – 94
MCV	>18 years	Female	80 – 96
Basophil count x 10^9/l	0 minutes – 24 hours	All	0.0 – 0.1
Basophil count	1 day – 14 days	All	0.0 – 0.1
Basophil count	14 days – 2 months	All	0.02 – 0.13
Basophil count	2 months – 6 months	All	0.02 – 0.20
Basophil count	6 months – 12 months	All	0.02 – 0.13
Basophil count	12 months – 6 years	All	0.02 – 0.12
Basophil count	6 years – 12 years	All	0.02 – 0.12
Basophil count	12 years – 18 years	All	0.02 – 0.12
Basophil count	>18 years	All	0.0 – 0.1
Eosinophil count x 10^9/l	0 minutes – 24 hours	All	0.0 – 0.85
Eosinophil count	1 day – 14 days	All	0.0 – 0.85
Eosinophil count	14 days – 2 months	All	0.05 – 0.9
Eosinophil count	2 months – 6 months	All	0.1 – 1.1
Eosinophil count	6 months – 12 months	All	0.05 – 0.9
Eosinophil count	12 months – 6 years	All	0.05 – 1.1
Eosinophil count	6 years – 12 years	All	0.05 – 1.0
Eosinophil count	12 years – 18 years	All	0.05 – 0.8
Eosinophil count	>18 years	All	0.04 – 0.4

Lymphocyte count x 10^9/l	0 minutes – 24 hours	All	2.0 – 7.3
Lymphocyte count	1 day – 14 days	All	2.8 – 9.1
Lymphocyte count	14 days – 2 months	All	3.3 – 10.3
Lymphocyte count	2 months – 6 months	All	3.3 – 11.5
Lymphocyte count	6 months – 12 months	All	3.4 – 10.5
Lymphocyte count	12 months – 6 years	All	1.8 – 8.4
Lymphocyte count	6 years – 12 years	All	1.5 – 5.0
Lymphocyte count	12 years – 18 years	All	1.5 – 4.5
Lymphocyte count	>18 years	All	0.9 – 3.2
Monocyte count x 10^9/l	0 minutes – 24 hours	All	0.0 – 1.9
Monocyte count	1 day – 14 days	All	0.1 – 1.7
Monocyte count	14 days – 2 months	All	0.4 – 1.2
Monocyte count	2 months – 6 months	All	0.2 – 1.3
Monocyte count	6 months – 12 months	All	0.2 – 0.9
Monocyte count	12 months – 6 years	All	0.15 – 1.3
Monocyte count	6 years – 12 years	All	0.15 – 1.3
Monocyte count	12 years – 18 years	All	0.15 – 1.3
Monocyte count	>18 years	All	0.15 – 1.3
Neutrophil count x 10^9/l	0 minutes – 24 hours	All	2.7 – 14.4
Neutrophil count	1 day – 14 days	All	1.5 – 5.4
Neutrophil count	14 days – 2 months	All	0.7 – 4.8
Neutrophil count	2 months – 6 months	All	1.0 – 6.0
Neutrophil count	6 months – 12 months	All	1.0 – 8.0
Neutrophil count	12 months – 6 years	All	1.5 – 8.5
Neutrophil count	6 years – 12 years	All	1.5 – 8.0
Neutrophil count	12 years – 18 years	All	1.5 – 6.0
Neutrophil count	>18 years	All	1.4 – 6.6
Platelet count x 10^9/l	0 minutes – 24 hours	All	150 – 450
Platelet count	1 day – 14 days	All	170 – 500
Platelet count	14 days – 2 months	All	210 – 650
Platelet count	2 months – 6 months	All	210 – 560
Platelet count	6 months – 12 months	All	200 – 550
Platelet count	12 months – 6 years	All	210 – 490
Platelet count	6 years – 12 years	All	170 – 450
Platelet count	12 years – 18 years	All	180 – 430
Platelet count	>18 years	All	140 – 440
Reticulocyte count x 10^9/l	0 minutes – 24 hours	All	110 – 450
Reticulocyte count	1 day – 7 days	All	10 – 80
Reticulocyte count	7 days – 1 month	All	10 – 65
Reticulocyte count	1 month – 2 months	All	35 – 200
Reticulocyte count	2 months – 5 months	All	15 – 110
Reticulocyte count	5 months – 12 months	All	30 – 130
Reticulocyte count	>12 months	All	50 – 100
Erythrocyte Sedimentation Rate mm/hour	All	Male	0 – 10
Erythrocyte Sedimentation Rate	All	Female	0 – 20

Full Blood Counts in Pregnancy

Anaemia is defined by Hb <11g/dl in first trimester, <105g/dl in second and third trimesters, and <10g/dl in postpartum period*.

*BSCH UK Guidelines for the management of iron deficiency in Pregnancy, 2019.

Period of Gestation	First trimester	Second Trimester	Third Trimester
RBC x 10^{-12}/l	3.52-4.52	3.2-4.41	3.1-4.44
HB g/dl	11-14.3	10-13.7	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	81-99
WBC x 10^{-9}/l	5.7-13.6	6.2-14.8	5.9-16.9
Neutrophil count x 10^{-9}/l	3.6-10.1	3.8-12.3	3.9-13.1
Lymphocyte count x 10^{-9}/l	1.1-3.5	0.9-3.9	1-3.6
Monocyte count x 10^{-9}/l	0-1	0.1-1.1	0.1-1.1
Eosinophil count x 10^{-9}/l	0-0.6	0-0.6	0-0.6
Basophil count x 10^{-9}/l	0-0.1	0-0.1	0-0.1
Platelet count x 10^{-9}/l	174-391	171-409	155-429

Table above: 95% ranges for haematological variables during pregnancy
Taken from 'Blood Cells. A practical Guide.' Barbara J. Bain, 5th Edition, 2015.

Fungal Microscopy and Culture

See Mycology

GATA Mutational analysis

Laboratory:	Referred from Haematology to North Bristol NHS Trust, Bristol Genetics Lab, Pathology Sciences, Southmead Hospital, Westbury-On-Trym, Bristol, BS10 5NB
Specimen:	3 mL EDTA
Comment:	By arrangement only with laboratory
Turnaround:	64 working days
Report:	Sent to referring clinician and copy filed in laboratory

Gastrin

Laboratory:	Referred from Biochemistry to SAS Centre, Charing Cross Hospital
Specimen:	10 ml EDTA blood (overnight fast) 3 ml non-hemolysed plasma for full screen.
Turnaround:	10 weeks
Ref. range:	See report form

G6PD Assay

Laboratory:	Referred from Haematology t to Viapath Analytics, The Red Cell Centre, Reference Haematology, King's College Hospital (Kingspath Hospital)
Specimen:	Blood 3mL purple Vacuette® (EDTA)
Comment:	Used in the investigation of Hereditary Haemolytic Anaemias. It is recommended that assays not be performed after severe haemolytic crisis, since G6PD levels may be falsely elevated. Test available Monday to Friday, during routine working hours. Unsuitable for analysis if Reticulocyte count is >150 x 10^9/L, may be referred
Turnaround:	60 working days
Ref. Range:	4.6 – 13.5 U/g Hb. Note: Values for new-borns may range somewhat higher, see final report

G6PD Screen

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA)

Comment: Used in the investigation of Hereditary Haemolytic Anaemias. Samples which have been determined deficient or intermediate by this qualitative method are referred. It is recommended that assays not be performed after severe haemolytic crisis, since G6PD levels may be falsely elevated. Test available Monday to Friday, during routine working hours.
Unsuitable for analysis if Reticulocyte count is >150 x 10^9 /L
Sulfasalazine or its metabolites may interfere with this test, so results are not valid for individuals taking these medications

Turnaround: 1 week

Ref. Range: Normal/Decreased/Inconclusive

Gamma-Glutamyltransferase (γ-GT)

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain tube (clotted sample)

Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Ganglioside Antibodies

Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Turnaround: Approx. 3 Weeks

Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Gastric Parietal Cell Ab

Laboratory: Autoimmune Serology

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Comment: Qualitative Immunofluorescence assay. Part of Autoantibody Screen.

Turnaround: 24 Hours

Ref. Range: Not applicable

Gastrointestinal stromal tumours (GIST) - C-Kit Mutation Analysis, PDGFR Mutation Analysis

Laboratory: Specimen referred from Histopathology to Dr. Cathal O'Brien, Cancer Molecular Diagnostics, St James' Hospital Dublin

Specimen: Histopathology Tissue block

Turnaround: 4 weeks

GBM (Glomerular Basement Membrane Antibodies)

Laboratory: Autoimmune Serology

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Comment: Quantitative Immunoassay using Phadia Unicap 250 analyser. Restricted to CUH patients.

Turnaround: 72 Hours

Ref. Range: 0 - 10 AU/mL

GBMQ (GBM Quick Test)

Laboratory: Autoimmune Serology

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Comment: Qualitative Quick Card Test (5 Minutes)

Turnaround: On Request.

Ref. Range: Not applicable

Gene Panels, NGS

Laboratory:	Referred from biochemical genetics to CeGaT diagnostics in Germany
Specimen:	3ml EDTA
Comment:	Request forms at https://cegat.com/diagnostics/diagnostic-methods/panel-diagnostics/ DO NOT TICK TO RECEIVE SECONDARY FINDINGS! Phone ext 22531 to discuss requirements
Turnaround	See webste
Ref. Range:	Report sent to clinician and copy scanned to biochemical genetics

Genital Swab

See also *Chlamydia trachomatis* PCR and *N. gonorrhoea* PCR

Laboratory: Microbiology (Main laboratory)

Specimen: Specimens for culture and sensitivity testing should be taken in the following situations:

- The patient is clearly symptomatic of gonoccal infection.
- The patient has tested positive for *N. gonorrhoea* on the urine cobas assay but has not yet commenced treatment.
- There is evidence of treatment failure.
- The patient is a known contact, and immediate epidemiological treatment is to be given.

Because genital specimens are often taken from sites harbouring large numbers of commensal (normal) flora, attention to specimen selection and collection methods is critical.
Specimens should be collected using a sterile swab and transported ASAP in charcoal containing transport media.
The viability of *N. gonorrhoeae* is lost over time.
If processing is delayed, storage at ambient temperature is preferred.

Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.

Turnaround: Prelim: 24 hours; Final: 72 hours.

Report: Culture report on any clinically significant isolate with the appropriate sensitivities.

Genitourinary –Molecular Testing and ICC for Renal Tumours

Laboratory: Specimen referred from Histopathology to Dr. Lisa Browning, Cellular Pathology, Oxford University Hospital.

Specimen: Histopathology Tissue block

Turnaround: 4 weeks

Gentamicin / Genticin

Refer to Antibiotic Assays

Glucocorticoid Remedical Aldosteronism (GRA)

Laboratory: Referred from Biochemical Genetics to East Genomic Laboratory Hub, Cambridge

Specimen: 3-5ml EDTA blood

Comment: Use request from for rare disease at https://www.eastgenomics.nhs.uk/ Please note: invoices will be issued to the referring clinician.

Turnaround: See website

Report: Sent to referring clinician and copy scanned to biochemical genetics

Glucose

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL Sodium fluoride EDTA

Comment: Grey-capped specimen tube. Fluid Glucose should also be taken into a Grey-capped specimen.

Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	WHO Guidelines. See report form

Glucose (POCT)

Laboratory:	Point of Care
Specimen:	Whole Blood (Fingerprick)
Comment:	POCT Glucose results are for monitoring only and should **NOT** be used for diagnosis of Diabetes Mellitus
Turnaround:	Time to result: 6 secs
Ref. Range:	3.9 – 7.0 mmol/L. (WHO Guidelines)

Glucose (Urinary)

Laboratory:	Clinical Biochemistry or ward / GP surgery
Specimen:	Fresh spot urine sample
Comment:	Measured using dipstick. Aged sample invalidates result.
Turnaround:	1 Day
Ref. Range:	Should be NEGATIVE

Glutamic Acid Decarboxylase Antibodies

Laboratory:	Sample for GAD and IA2 are referred from Autoimmune Serology to Immunology lab, Exeter.
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround:	Approx. 3 Weeks
Ref. Range:	See report form.

Group B Streptococcal PCR

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	1mL EDTA blood, CSF (0.5mL)
Comment:	Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin
Turnaround:	10 working days. Samples received by IMSRL before 11am, verbal result between 4pm and 5pm the same day (positive only).
Report:	Detected or not detected

Growth hormone (GH)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	2 Weeks
Comment:	Haemolysed samples should be interpreted with care Samples should be transported to the laboratory as soon as possible and must be frozen within 24hours
Ref. Range:	It is not possible to quote a reference range for random Growth Hormone due to the episodic nature of its secretion. These measurements therefore are not recommended. Contact Biochemistry

Gut Hormone profile (Gastrin, PP, Somatostatin,VIP, Chromogranin A, Chromogranin B, Glucagon, CART)

Laboratory:	Sample referred from Clinical Biochemistry to SAS Laboratory, Charing Cross Hospital
Specimen:	10 ml EDTA blood (overnight fast). 3 ml non-hemolysed plasma for full screen.
Comment:	Consultant request only. Sample must be received on ice, spun and frozen at -20 ºC within 15 mins.
Turnaround:	10 weeks
Ref. Range:	See report form.

Guanidinoacetate/creatine

Laboratory:	Sample referred from Clinical Biochemistry to Biochemical Genetics Unit, Addenbrookes
Specimen:	MSU + 0.5ml Li-Hep Plasma
Turnaround:	5 weeks
Ref. Range:	See report form

Haemochromatosis

Laboratory:	Referred from Biochemical Genetics to Exeter Genomics Laboratory
Specimen:	3.0 mL EDTA blood Use the HH specific request form on CUH website, www.cuh.hse.ie Indications for testing include elevated fasting transferrin saturation or a first-degree relative with genetically confirmed haemochromatosis.
Turnaround:	3 months
Report:	Sent to referring clinician and copy scanned to biochemical genetics Contact biochemical genetics ext 22531 to discuss results.

Haem-Oncology Molecular Genetics (Haematology)

Laboratory:	Specimen referred from Haematology to Cancer Molecular Diagnostics laboratory , St. James Hospital, Dublin 8
Specimen:	Blood 3mL purple Vacuette® (EDTA).
Comment:	Leukaemia: PML-RARa, MRD and Chimaerism, TCR (T cell receptor), gene rearrangements, should be requested on the advice of a consultant haematologist.
Turnaround:	60 working days
Report:	Sent to referring clinician and copy filed in laboratory

Haemoglobin HbA1c Glycosylated Haemoglobin

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA) Paediatric EDTA containers available from the paediatric diabetic Dept CUH, NB Primary paediatric tubes must be clearly labelled.
Comment:	Test available Monday to Friday, during routine working hours. As blood glucose rises, the increase in non – enzymatic glycation of proteins is proportional to both the level of glucose and the life span of the proteins in the circulation or tissues, therefore the measurement of HB A_{1c} reflects the effectiveness of treatment in diabetes mellitus. Due to elevated HbF levels this test is unsuitable for neonates and patients < 6 months Interfering haemaglobins which are not detected by the Tosoh G8 include Hb Petah Tikva. This is frequently seen in Israel. The Tosoh G8 results the HbA1c as higher.
Turnaround:	24 – 48 hours
Ref. Range:	20 – 42 m mol/mol (IFCC)

Haemoglobin A_2 Electrophoresis

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA)
Comment:	Haemoglobin A_2 percentage is useful for the diagnosis of the beta thalassemias and related disorders. Test available Monday to Friday, during routine working hours.
Turnaround:	1 – 2 weeks.
Ref. Range:	>2yrs old 2 – 3.5% at birth 0.2 – 0.3%

Haemoglobin F

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA)
Comment:	Determined using HPLC / Electrophoresis Technologies. Test available Monday to Friday, during routine working hours.
Turnaround:	1 – 2 weeks
Ref. Range:	< 2% in adults.

Haemoglobins S, C, D and E Electrophoresis

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA).
Comment:	Determines the percentage of Hb S, C, D and E, that may be present in variant haemoglobins. Test available Monday to Friday, during routine working hours.
Turnaround:	1 – 2 weeks
Ref. Range:	Normal: <1.0%

Haemoglobin S Sickle Cell Screen

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA).
Comment:	Test available Monday to Friday during routine working hours. The laboratory must be contacted for all emergencies and out of hour requests. Used in screening for sickle cell disease and sickle cell trait. In the neonatal period HB F will be present in large amounts and so may mask the presence of HB S, if necessary the test should be repeated when the infant > 6 months.
Turnaround:	Emergency specimens: 2 hours Routine specimens: 24 hours
Ref. Range:	Positive / Negative

Haemoglobinopathies – Haemoglobinopathy

Laboratory:	Sample referred from Haematology to the National Haemoglobin Reference Laboratory, Oxford Haemophilia Centre, Churchill Hospital, Oxford OX3 7LJ
Specimen:	Example: HbE, Thalassaemias and high affinity haemoglobins Blood 3mL purple Vacuette® (EDTA) Due to elevated HbF levels Thalassaemia screening is unsuitable for neonates and patients < 6 months
Comment:	A consent form is required to perform this test. www.oxfordradcliffe.nhs.uk/molhaem (Haemoglobinopathies website) Test available Monday – Wednesday before 12.00 noon
Turnaround:	12 weeks (84 working days) but may vary depending on complexity of analysis
Report:	Sent to referring clinician and copy filed in laboratory

Haemolysin Test

Laboratory:	Blood Transfusion Laboratory
Specimen:	1 x 4 mL Clotted Sample (red cap with yellow ring)
Comment:	Usually performed on mothers of new-born babies in the investigation of ABO incompatibilities. Complete the Blood Transfusion request form LF-C-BTR-XMATCH. This is not an accredited test.
Turnaround:	3 hours
Ref. Range:	Positive or Negative

Haemophilia MH Research

Laboratory:	Referred from Haematology to HMD Laboratory, St James' Hospital
Specimen:	3 ml EDTA, minimum x 2 EDTA, 6 – 20 mls
Comment:	By arrangement only with Haematology
Turnaround:	120 working days
Ref. Range:	Not applicable

***Haemophilus Influenzae* B Antibodies (IgG)**

Laboratory:	Clinical Biochemistry
Specimen:	Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment:	Test performed by reference laboratory (HPA Laboratory, Manchester).
Turnaround:	7 weeks
Report:	Positive or negative

***Haemophilus Influenzae* PCR**

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	1mL EDTA blood, CSF (0.5mL)
Comment:	Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin
Turnaround:	10 working days. Samples received by IMSRL before 11am, verbal result between 4pm and 5pm the same day (positive only).
Report:	Detected or not detected

Hantavirus Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	By arrangement
Report:	Qualitative result

Haptoglobin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

HbA1c (POCT)

Specimen:	Whole blood sample (fingerprick) Minimum sample volume = 1 uL of whole blood
Time to result:	6 minutes
Ref range:	20-42 mmol/mol (IFCC)
Comments:	Ideally, patients should have an individual target, balancing long-term risk of complications with quality of life and risk of hypoglycaemic events.

Sending a Venous Sample to Haematology

Laboratory Measurements (EDTA Sample) should be considered where:

1. Unable to obtain an adequate fingerprick blood sample.
2. Patient with severe anaemia (Hb <7 g/dL) or polycythaemia (Hb >24 g/dL) – these are unlikely in a child.
3. Patients with Haemolytic Anaemia.
4. Patients with substantial amounts of foetal heamoglobin.
5. Patients with heamoglobinopathies
6. Result appears questionable or if the clinical signs and symptoms appear inconsistent with the result.

βHCG

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	1 Day (In-patients/Urgent GP samples) 4 Days (non-Urgent samples)
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate Please contact the duty biochemist (ext 22870) if requesting βHCG on patients with suspected Gestational Trophoblastic Disease.

Heavy Metal Screen

Laboratory:	SAS Trace Element Unit, Southhampton University Hospitals
Specimen:	1 ml Sod Hep Trace metal free bottle **whole blood.** Urine sample required for Mercury analysis
Turnaround:	1-2 weeks
Ref. Range:	See report form.

***Helicobacter pylori* Antibodies**

This test is not available at the CUH laboratories.

***Helicobacter pylori* Culture and Sensitivity**

Laboratory:	Microbiology (Main laboratory)
Specimen:	Specimens will only be processed by prior arrangement with the laboratory. As media must be freshly prepared a minimum of **48 hours notice** is required for preparation of media, reagents *etc*. Two gastric biopsy specimens, one from the antrum and one from the body of the stomach, are taken during endoscopy, for culture. The biopsies are immediately introduced into transport medium, supplied by the laboratory, and sent directly to the Microbiology laboratory where they are processed immediately. Preferably patients should have ceased antimicrobial therapy and PPI therapy two weeks prior to endoscopy.
Comment:	Transport specimens directly to the laboratory. In cases where a delay in transport cannot be avoided (specimens being transported from outside hospitals), the specimens must be packed on ice. *Note:* H. pylori rapidly looses viability at room temperature and when exposed to air. Please include any appropriate clinical details, e.g. previous therapy failure, stating the antibiotics previously administered. Please state if the patient was on therapy when the biopsies were taken, as this will warrant further incubation time.
Turnaround:	Turnaround: Prelim report: 7 days, Final report: 14 days in cases where patients were taking antimicrobial agents at the time the biopsies were obtained.
Report:	Culture with the appropriate sensitivities

Heparin Assay (Anti Xa)

Laboratory:	Haematology
Specimen:	Blood 3mL, blue Vacuette® (sodium citrate 3.2%) Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment:	Used to monitor the effectiveness of low molecular weight heparin therapy. It is essential to state the details of the type of low molecular weight heparin (LMWH) on the request form. Test performed once weekly (presently Wednesdays) Specimen must be taken: 4 hours post administration.
Turnaround:	1 week.
Ref. Range:	Refer to report

Heparin /PF4 Antibody Test (HIT; Heparin Induced Thrombocytopenia screening test)

Laboratory: Haematology by prior arrangement with Haematology laboratory staff during routine hours only.
Specimens are referred for ELISA testing to Haematology to National Coagulation Laboratory, St., James Hospital, Dublin 8

Specimen: Two Blood 4mL red top Vacuette® (or similar container for clotted blood)

Comment: Patients must be off all anticoagulants, and details of the anticoagulation history of the patient must be supplied.
4T Score MUST be supplied on all requests.
HIT request form **must** be filled in. Available at http://www.stjames.ie/GpsHealthcareProfessionals/Referral/ReferralForms/HIT%20request%20form%20Version%202%2025th%20August%202015.pdf

Turnaround: ELISA Test (referral laboratory): 36 working days

Report: Sent to referring clinician and copy filed in laboratory

Hepatitis A IgM Antibody

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Comment: A qualitative test for the detection of IgM antibody to hepatitis A virus. It can be used as an aid in the diagnosis of acute or recent hepatitis A infection.
Hepatitis A IgM testing is only routinely performed on samples from children <14yrs or on samples from people recently returned from overseas.
Otherwise request with a full patient history or in outbreak situations.
Anti-HAV IgM reactivity should be correlated with patient history and other hepatitis markers for diagnosis of past or present infection.

Turnaround: 36 hours

Report: Qualitative result

Hepatitis A IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Comment: Test is used to determine the immune status to hepatitis A and is often used to monitor the success of hepatitis A vaccination. It is often performed prior to vaccination in certain risk groups, e.g., army personnel going on overseas duty.

Turnaround: 36 hours

Report: Qualitative result

Hepatitis B Australia Antibody (Anti-HBs)

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Turnaround: Routine: 36 hours. Urgent: within 2 hours of receipt.

Report: Quantitative value (mIU/mL)

Comment: This test is used to check the immune status to hepatitis B and is often used to monitor the success of hepatitis B vaccination. Please indicate patient vaccination history on the request form.

Management Following Post-Vaccination Testing:

Anti-HBs Level	Action Required
≥10 mIU/mL	Good response. No further action required.

	Non-responder. Test for anti-HBc and HBsAg. If anti-HBc and HBsAg negative, repeat course of hepatitis B vaccine (use a different brand).
<10 mIU/mL	Recheck anti-HBs 2 months later and if anti-HBs remains <10 mIU/mL, consider further vaccination as per national guidelines. Recheck anti-HBs 2 months later and if anti-HBs remains <10 mIU/mL, person is susceptible to HBV.

Source: National Immunisation Guidelines (June 2020)

Hepatitis B Core Antibody (Anti-HBc)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Test will detect total antibody to hepatitis B core antigen, i.e., IgM and/or IgG. A positive result indicates present or past infection with the hepatitis B virus. This test should be interpreted in conjunction with other hepatitis B markers.
Turnaround:	36 hours
Report:	Qualitative result

Hepatitis B Surface Antigen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	A positive result may indicate acute or chronic carriage of the hepatitis B virus. Positive specimens are considered presumptive positive only and a repeat specimen is requested. Positive specimens are tested with a full hepatitis B virus marker profile, which includes anti-HBc, HBeAg, anti-HBe and anti-HBs.
Turnaround:	Routine: 36 hours. Urgent: within 2 hours of receipt.
Report:	Qualitative result

Hepatitis C Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Positive specimens are considered presumptive positive only and a repeat specimen is requested. All new positives are referred to National Virus Reference Laboratory (NVRL) in Dublin for confirmation.
Turnaround:	Routine: 36 hours. Urgent: within 2 hours of receipt. Please allow more time for samples testing positive in house.
Report:	Qualitative result

Hepatitis C Antigen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Test performed weekly. This test is restricted to dialysis patients. A repeat sample is requested for all new positives.
Turnaround:	8 working days
Report:	Qualitative result

Hepatitis D Antibody (Total)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Hepatitis delta virus (HDV) is in fact a sub-viral particle that relies on hepatitis B virus (HBV) to cause infection in humans. Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).
Turnaround:	14 working days
Report:	Qualitative result

Hepatitis E IgG

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

Hepatitis E IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

Hepatitis Screen

See Hepatitis B Surface Antigen and Hepatitis C Antibody

Hereditary Fever Syndromes (FMF, TRAPS)

Laboratory:	Referred from Biochemical Genetics to National Amyloidosis Centre at UCL
Specimen:	3ml EDTA blood
Comment:	Genetics requested via the National Amyloidosis website: https://www.ucl.ac.uk/amyloidosis/national-amyloidosis-centre/molecular-genetic-te a copy of the referral form to the laboratory in CUH. Please note: invoices will be issued to the referring clinician.
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Herpes Simplex Virus IgG

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Qualitative result

Herpes Simplex Virus 1/2 Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Viral swab, CSF, nasopharyngeal aspirate, sputum, broncho-alveolar lavage, urine, 4mL EDTA blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

5-HIAA

Laboratory:	Sample referred from Clinical Biochemistry to Beaumont hospital.
Specimen:	24-hour urine sample collected into a container, which has acid, added. 24 hr urine containers are available from stores; acid is added in the Biochemistry lab. Avoid following foods for 48h before collection: bananas, chocolate, tomatoes, grapefruit, walnuts, avocado, pineapple, plums, dried fruit, citrus fruit, tea and coffee
Turnaround:	3 weeks
Ref. Range:	See report form.

High Density Lipoprotein (HDL)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate. Target values apply to pts at low or moderate risk CVD

Histone Antibodies

Laboratory:	Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.
Specimen:	Blood, 4mL red top Vacuette (or similar container for clotted blood)
Turnaround:	Approx. 3 Weeks
Ref. Range:	See report form, or visit internet site https://www.*eurofins.ie/biomnis/* for up to date referral test information.

Histoplasma Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (UKHSA Mycology Reference Laboratory, Bristol)
Turnaround:	28 working days
Report:	Qualitative result

HLA B27 Typing

Laboratory:	Blood Transfusion Laboratory
Specimen:	1x 3 ml EDTA purple cap (FBC) tube.
Comment:	Complete the Blood Transfusion request form clearly indicating that consent for the test has been obtained from the patient. Samples received without confirmation of consent cannot be processed. A specific consent form is available from the Blood Transfusion Laboratory or available on the CUH website http://www.cuh.hse.ie/Our-Services/Our-Specialities-A-Z-/Laboratory-Medicine/Services-Provided/Downloads/Molecular-Genetics-Request-for-HLA-B27.pdf This is an INAB accredited test.
Turnaround:	3 weeks
Ref. Range:	Not applicable.
Limitations	The primers used in the test kit used by the laboratory are expected to miss the following HLA B27 alleles: B*27:04:03, B*27:07:01, B*27:07:02, B*27:07:03, B*27:07:04, B*27:102, B*27:11, B*27:125, B*27:14, B*27:19, B*27:20, B*27:21, B*27:24, B*27:30, B*27:32, B*27:33, B*27:34, B*27:36, B*27:43, B*27:70, B*27:81, B*27:90:01, B*27:90:02.

HLA Typing Class I and Class II (pre-Bone Marrow Transplant)

Laboratory:	Blood Transfusion Laboratory
Specimen:	3 x 4 ml EDTA purple cap (FBC) tube. Arrange for samples to be delivered to laboratory between Monday to Thursday.
Comment:	HLA typing referred to: HLA Department, I.B.T.S., National Blood Centre, James's St., Dublin 8. Mon. to Thurs. Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH This is not an INAB accredited test.
Turnaround:	3 weeks
Ref. Range:	Not applicable.

HLA Typing (Disease Association e.g. HLA DQ2, HLA DQ8)

Laboratory:	Blood Transfusion Laboratory
Specimen:	3 x 4 ml EDTA purple cap (FBC) tube. Arrange for samples to be delivered to laboratory between Monday to Thursday.
Comment:	HLA typing referred to: HLA Department, I.B.T.S., National Blood Centre, James's St., Dublin 8. Mon. to Thurs. Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH This is not an INAB accredited test.
Turnaround:	3 Weeks
Ref. Range:	Not Applicable

HLA Typing (re: Solid Organ Transplant)

Laboratory:	Blood Transfusion Laboratory
Specimen:	10 ml Citrate (blue cap bottle). 7.5 ml EDTA (purple cap bottle), 10 ml clotted sample (red cap bottle).
Comment:	This test is carried out by Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9. Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH or equivalent. This is not an INAB accredited test.
Turnaround:	Contact Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.
Ref. Range:	Not Applicable

HLH Granule release assay (Haemophagocytic Lympho Histocytosis)

Laboratory:	Referred from Haematology to Great Ormond Street Hospital
Specimen:	EDTA x 5mls
Comment:	Consultant sending sample for these assays needs to contact Great Ormond street as assay needs to be prepared beforehand. Request form must be completed, available on Great Ormond street website
Turnaround:	20 working days
Report:	Sent to referring clinician and copy filed in laboratory

Homocystine – Total (Paediatric patients)

Laboratory:	Sample referred from Clinical Biochemistry to The Children's Hospital, Temple Street, Dublin
Specimen:	Lithium Heparin sample which must be separated within 10 minutes of collection. Time must be stated on bottle and on form
Comment:	Please advise the lab in advance. Free Homocystine is no longer available.
Turnaround:	1 week
Ref. Range:	See report or contact Biochemistry Laboratory, Temple Street Hospital

HMGCoAR Antibodies

Laboratory:	Sample referred from Clinical Biochemistry to Oxford Department of Clinical Immunology
Specimen:	1 ml serum FROZEN
Turnaround:	3 weeks from receipt in Referral Laboratory
Ref. Range:	See report form or contact Oxford Department of Clinical Immunology, ph: +44 (0) 1865225995

HMMA (VMA)

Laboratory:	Sample referred from Clinical Biochemistry to BEAUMONT Hospital Dublin
Specimen:	Spot urine sample. Sample must be brought to Biochemistry laboratory immediately to have acid added.
Turnaround:	2 weeks
Ref. Range:	See report form or contact Biochemistry Laboratory BEAUMONT Hospital

HPA (Human Platelet Antigen + Antibody Investigation for NAITP)

Laboratory:	Blood Transfusion Laboratory
Specimen:	Baby: 1 mL EDTA Mother: 5 mL EDTA and 20 mL Clotted Father: 20 mL EDTA
Comment:	Only by prior arrangement with Blood Transfusion Laboratory, CUH Complete Form NBC/HLA/F320 (Available from Blood Transfusion Laboratory, CUH) Referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8. This is not an accredited test.
Turnaround:	Refer to IBTS, Dublin.
Ref. Range:	Refer to IBTS, Dublin.

HTLV-I/II Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dubln)
Turnaround:	14 working days
Report:	Qualitative result

Human Herpes Virus 6 (HHV-6) Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, 4mL EDTA blood, CSF, saliva
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Human Herpes Virus 8 (HHV-8) Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL EDTA blood
Comment:	Test performed by a reference laboratory (Virus Reference Department, London)
Turnaround:	28 working days
Report:	Detected or not detected

Human Immunodeficiency Virus (HIV) Serology

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Detects HIV antigen and antibody to HIV1 and HIV2.

	Positive specimens are referred to the National Virus Reference Laboratory, University College Dublin, for confirmation.
Turnaround:	Negative samples: 36 hours Samples positive in house: 14 working days (confirmation required)
Report:	Qualitative result

HVA

Laboratory:	Sample referred from Clinical Biochemistry to BEAUMONT Hospital Dublin
Specimen:	Spot urine sample. Sample must be brought to Biochemistry laboratory immediately to have acid added
Turnaround:	2 weeks
Ref. Range:	See report form or contact Biochemistry Laboratory BEAUMONT Hospital

Hydatid Cyst

See Echinococcus Antibodies

3 Hydroxybutyrate (3HB/Blood Ketones)

Laboratory:	Sample referred from Clinical Biochemistry to Sheffield Children's NHS
Specimen:	1.2 ml Fluoride oxalate plasma
Comment:	0.5ml min
Turnaround:	4 weeks
Ref. Range:	See report form

Hydroxyprogesterone (Alpha 17-Hydroxyprogesterone)

Laboratory:	Sample referred from Clinical Biochemistry to St James Hospital, Dublin
Specimen:	2.0 mL blood in a plain tube (clotted sample)
Comment:	Consultant request only
Turnaround:	4 weeks
Ref. Range:	See report form

Hydroxyprogesterone (Alpha 17-Hydroxyprogesterone) Blood Spots

Laboratory:	Sample referred from Clinical Biochemistry to University Hospital of Wales.
Specimen:	Blood spots taken at 4 points through the day. See comment.
Comment:	Consultant request only
Turnaround:	3 – 4 weeks
Ref. Range:	Contact laboratory

IgD

Laboratory:	Sample referred to Sheffield Protein Reference Unit.
Specimen:	4.0 mL blood in a plain tube (clotted sample)
Comment:	Consultant request only
Turnaround:	6 weeks
Ref. Range:	See report form

IgE Total and Specific

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	Up to 14 Days
Ref. Range:	Contact CUH Biochemistry Laboratory

IgG Subclasses

Laboratory:	Sample referred to Eurofins-Biomnis Laboratories
Specimen:	4.0 mL blood in a plain tube (clotted sample)
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Immunoglobulin gene rearrangements (Clonality studies)

Laboratory: Sample referred from Pathology to CMD, St. James Hospital
Specimen: FFPE tissue block
Turnaround: 6 weeks
Ref. Range: Not applicable

Immunoglobulins / Electrophoreisis

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood a plain tube (clotted sample)
Comment: Age related reference values are available from Laboratory on request
Turnaround: 5 Days * Note additional testing such as Immunofixation and/or serum free light chain analysis may increase the turnaround time
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Infectious Mononucleosis Screening test

Laboratory: Haematology
Specimen: EDTA specimen
Comment: This test is only performed if the results of the Full Blood Count and/or manual differential suggest Infectious Mononucleosis, clinicians are requested to send a confirmatory test to Clinical Microbiology for EBV status on all positive screens.
Comment added to all Negative results: A negative Monospot screen does not preclude IM infection. Result must be interpreted in conjunction with clinical details.
Turnaround: Not applicable
Report: Positive or Negative

INR (International Normalised Ratio)

Laboratory: Haematology: See Prothrombin Time (PT)

In Situ Hybridisation for Her2:Chromosome 17 ratio

Laboratory: Histopathology
Specimen: Formalin Fixed Paraffin Embedded Tissue.
Comment: This test is performed on a subset of breast and gastric cancer cases and other cases as required.
Turnaround: 10 working days
Report: Report is expressed as a ratio of Her 2 gene copy number divided by Chromosome 17 copy number.

Intrinsic Factor Antibodies

Laboratory: Haematology
Specimen: Blood 4mL Red Vacuette® (clotted blood).
Comment: Test available Monday to Friday, during routine working hours.
Tests for IF antibodies are carried out on patients with suspected megaloblastic anaemia and a depressed serum vitamin B_{12} to aid in the diagnosis of pernicious anaemia.
Free B12 levels of >444 ng/L can give false positive results.
Turnaround: 7 working days
Report: Negative / Indeterminate / Positive

Insulin

Laboratory: Clinical Biochemistry
Specimen: 2 mL blood in a plain tube (clotted sample)
Comment: Consultant request only
Turnaround: 7 days

Ref. Range: Insulin levels should be appropriate for the glucose level at the time the sample was taken. Glucose should always be measured at the same time as the insulin to facilitate interpretation of results.

Comment Haemolysed sample unsuitable. Urgents available on request

Insulin Antibodies

Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.

Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)

Turnaround: Approximately 3 Weeks

Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Insulin like Growth Factor 1

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in a plain tube (clotted sample), fresh sample.

Comment: Haemolysed samples should be interpreted with care.
Samples should be transported to the laboratory as soon as possible and must be frozen within 24hours

Turnaround: 2 weeks

Ref. Range: Age and gender based. See report.

Insulin like Growth Factor BP3 (IGBP3)

Laboratory: Sample referred from Biochemistry to SAS Peptide Hormones Section, Royal Surrey County Hospital, Guildford, Surrey.

Specimen: 1 ml Serum

Turnaround: 7 weeks

Ref. Range: See report form

Intraocular Fluids / Corneal Scrapings

Laboratory: Microbiology (Main laboratory)

Specimen: Specialist collection according to local protocols – An ophthalmic surgeon will collect corneal scrapings and intraocular fluids. Because of the small amounts of material involved, initial inoculation of culture media and preparation of slides may need to be done at the patient's side.

The laboratory, in conjunction with local ophthalmologists, has agreed the following protocol for the collection of specimens, inoculation of media, and transport to the laboratory:

Corneal scrapings:

Scrapings should be taken aseptically (e.g. sterile scalpel blade)

Aseptically remove the cap of the nutrient broth.

Carefully, dip the tip of the scalpel, which contains the scrapings, into the broth and agitate gently.

Ensure that the scraping has been removed and discard the scalpel into a sharps bin.

Close the lid on the nutrient broth, label as appropriate, and send to the laboratory immediately.

If Acanthamoeba keratitis is considered, please supplement the above by an additional scraping taken in the same fashion but placed on PCR swab (obtained from Microbiology laboratory, refer to Acanthaoemba above). Send to the laboratory with the appropriately completed form – the laboratory must be notified in advance. The contact lens case and rinse fluids should also be sent to the laboratory.

Intraocular fluids:

Intraocular fluids which have been taken aseptically should be injected directly into an **equal volume** of nutrient broth, labelled as appropriate and sent to the laboratory as soon as possible with an appropriately labelled form.

Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Prelim: 24 hours; Final: 48-72 hours
Report:	Culture: Any clinically significant isolate with the appropriate sensitivities.

Intra-Uterine Contraceptive Device (IUCD)

Laboratory:	Microbiology (Main laboratory)
Specimen:	IUCDs should only be sent if clinical suspicion of infection exists. Place the entire IUCD, including any exudate, in a clean, sterile, leakproof container and transport ASAP. Specimen should be delivered to the laboratory as soon as possible to protect the viability of fragile organisms such as *Neisseria* spp.
Comment:	Test performed Monday to Friday 9-5pm.
Turnaround:	Prelim: 24 hours; Final: 48 – 72 hours. *Note:* Culture for Actinomycosis takes up to 17 days.
Report:	Any clinically significant isolate with the appropriate sensitivities. Culture for *Actinomyces* spp. Proceeding which will be reported if positive.

Intra-Uterine Infection Screen / TORCH Screen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood (Minimum volume for baby specimens: 1mL)
Tests:	*Toxoplasma gondii* IgM, rubella IgM, CMV IgM and parvovirus B19 IgM
Turnaround:	36 hours Positive Toxoplasma IgM result must be confirmed by a reference laboratory – 28 working days
Report:	Qualitative result

Intravascular Cannulae – Culture

See Catheter / Intravascular Cannulae

Iron

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Marked haemolysis invalidates the result
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

JC Virus Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, 4mL EDTA blood, CSF, urine, brain tissue
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

JAK2 in MPD (and CALR)

Laboratory:	Referred from Haematology Dept. to CMD in St James Hospital, Mon to Thurs to reach haematology lab by 12 noon,
Specimen:	Blood 9mLs, 3mL x 3 purple (may also use 6mL Purple), Vacuette® (EDTA) or Bone Marrow in 10mls in RPMI
Comment:	Mutation analysis in MPD
Turnaround:	60 working days
Report:	Sent to referring clinician and copy filed in laboratory

JAK2 Exon 12 mutation

Laboratory:	Referred from Haematology Dept. to Oncology Cytogenetics, 5th Floor Tower Wing, Guy's Hospital, Great Maze Pond, London SE1 9RT, Mon to Thurs to reach haematology lab by 12 noon.
Specimen:	Whole blood 3mL, purple, Vacuette® (EDTA) or Bone Marrow in 10mls in RPMI
Turnaround:	64 days
Report:	Sent to referring clinician and copy filed in laboratory

Joint Aspirate for Crystals

Laboratory:	Histopathology (Cytology Department)
Specimen:	Joint Fluid
Comment:	Tests are performed routinely Monday to Friday during routine working hours
Turnaround:	Can be immediate if urgently requested by prior communication, routine 1-2 days
Ref. Range:	Not applicable

Joint Fluid – Microbiology

See Sterile Body Fluid – Microscopy and Culture.

Karyotyping (see Chromosome analysis)

Keppra (Levetiracetam)

Laboratory:	Sample referred from Clinical Biochemistry to Birmingham City Hospital
Specimen:	EDTA plasma
Comment:	Keppra is indicated as monotherapy in the treatment of partial onset seizures with or without secondary generalisation in adults and adolescents from 16 years of age with newly diagnosed epilepsy
Turnaround:	5 days from receipt in referral laboratory
Ref. Range:	Not applicable

Ketone (POCT)

Laboratory:	Point of Care
Specimen:	Whole Blood (Fingerprick)
Turnaround:	Time to result: 10 secs
Ref range:	0 - 0.6 mmol/L (Ref: American Diabetes Association. Diagnosis and Classification of Diabetes: Standards of Medical care in Diabetes. Diabetes Care, Volume 41, Supplement 1, January 2018)

Kleihauer Test for Foetal Cells FMH

Laboratory:	Haematology, and bleeds of ≥4mls in postnatal patients are referred to Rotunda Hospital for flow Cytometry
Specimen:	Blood 3mL purple Vacuette® (EDTA)
Comment:	Test available Monday – Friday during routine working hours, and Sunday of bank Holiday weekends. For all other emergencies a Consultant to Haematology Consultant request is required. It is a procedure that identifies individual cells containing HB F. It has proved useful in determining the extent of foetal bleed into the maternal circulation, and can be used to calculate the dose of Anti-D to be administered to the patient. Kleihauer test is only validated for the administration of Anti-D to Rh Neg mothers. Kleihauer test is not performed on Rhesus Positive women except in cases of Women who have had a late intrauterine foetal death (IUFD) after 18 completed weeks of pregnancy. All postnatal samples with Bleeds ≥4mls in postnatal patients are referred to the Rotunda Hospital for flow cytometry. Antenatal patients with bleeds ≥4mls are NOT referred. Flow cytometry in Rotunda is currently not validated for antenatal patients. Kleihauer on a rhesus D Neg mother of a baby with a weak D Ag are NOT referred. >12ml bleeds are phoned to requesting ward
Turnaround:	Emergency specimens: <2 hours Routine specimens: 24 – 72 hours.
Ref. Range:	To calculate dosage of Anti-D required refer to CUMH Anti-D dosage Policy.

Lacrimal (Tear Duct) Fluid

Laboratory:	Microbiology (Main laboratory)
Specimen:	Stones / secretions should be collected into a clean, sterile, leakproof container and immediately transported to the laboratory.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Prelim: 24 hours; Final: 48-72 hours
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.

Lactate

Laboratory:	Clinical Biochemistry
Specimen:	Blood in Fluoride Oxalate tube
Turnaround	2 hours
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Lactate dehydrogenase (LDH)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Haemolysis invalidates result
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

La (SS-B)

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative Elisa assay; automatically undertaken on all Anti-ENA positive sera.
Turnaround:	72 Hours
Ref. Range:	Not applicable

Lamotrigine (Lamictal)

Laboratory:	Referred from Clinical Biochemistry to Birmingham City Hospital
Specimen:	EDTA plasma
Comment:	Monitoring levels of Lamotrigine, antiepileptic drug which can induce allergic reactions, especially when taken at the same time as sodium valproate.
Turnaround:	I week from receipt in Referral Laboratory
Ref. Range:	See report or contact Referral laboratory Birmingham City Hospital, ph: +44 (0) 121 507 4271, +44 (0) 121 507 4138

Lead

Laboratory:	Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford
Specimen:	Sod Hep trace metal free tube (navy top)
Turnaround:	3 weeks
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Leishmania Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround:	28 working days
Report:	Qualitative result

Leishmaniasis

Laboratory:	Referred by Pathology to The Diagnostic Parasitology Laboratory, London.
Specimen:	Six unstained tissue sections
Turnaround:	6 weeks

Leptospira IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	Negative samples: 14 days Samples requiring confirmatory testing: 28 working days
Report:	Qualitative result

Leucocyte (White Cell) Antibody Investigation

Laboratory:	Blood Transfusion Laboratory
Specimen:	1 x 4 mL Clotted (Red Capped/Yellow Ring) Tube
Comment:	Samples referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8. Complete the Blood Transfusion request form LF-C-BTR-XMATCH or LF-C-BTR-ANTENAT. This is not an INAB accredited test.
Turnaround:	3 Weeks
Ref. Range:	Not Applicable

LH

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Lithium

Laboratory:	Clinical Biochemistry

Specimen: 4.0 mL blood in a plain tube (clotted sample)
Comment: Sample 12 hours post dose (trough sample)
Turnaround: 1 Day, TAT for GP requests is 4 days
Ref. Range: Recommended range for maintenance therapy. Acute therapy may require levels up to 1.2 mmol/L
Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Liver Biopsy for Copper /Iron Estimation

Laboratory: Referred from Pathology Laboratory to Trace Elements Laboratory, Kings College Hospital, London for Synnovis
Specimen: Liver Biopsy unfixed
Comment: Biopsy: Transfer from the biopsy needle without delay. At least 1 cm is required (or results may be invalid due to liver non-homogeneity). Clearly label a sterile universal container with Patients name, date of birth, specimen type and date sample is taken. Place the biopsy between two pieces of 2.5cm filter paper, (larger pieces do not need to be on filter paper), moistened with distilled water only, as the use of formalin or saline can lead to contamination or leaching out of certain elements. If the specimen is to be divided eg for histology, use a new scalpel blade and divide the sample in two. The second piece for histology is placed in a second clearly labelled container in neutral buffered formalin. Transport the specimen(s) to the Histology laboratory.
Turnaround: 4 weeks
Ref. Range: 20-50 µg/g Dry Weight

LKM (Liver/Kidney Microsome Antibodies)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Reported if seen on Autoantibody Screen.
Turnaround: 24 Hours
Ref. Range: Not applicable

Low Density lipoprotein (LDL)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Calculation. Results not reported if Triglyceride > 4.5 mmol/L
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Low Vaginal Swab

Laboratory: Microbiology (Main laboratory)
Specimen: Investigation of vulvo-vaginitis in paediatric patients. Only swabs sent in suitable transport medium will be processed – swabs that are sent without transport medium may be dry and may not yield the targeted organisms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround: Prelim: 24 hours; Final: 48-72 hours
Ref. Range: Culture: Any clinically significant isolate with the appropriate sensitivities

Lupus Anticoagulant Screen (ACAB IgG /IgM/B2GP1) Antiphospholipid screen

Laboratory: Haematology

Specimen: Blood 3mL x 2, blue Vacuette® (sodium citrate 3.2%) and 1 x 4mL red top Vacuette (clotted).
(Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).
Samples must be received within 4 hours of phlebotomy.
Note: BCSH guidelines on thrombophilia testing must be adhered to.

Comment: Test available Monday to Friday, during routine working hours. Lupus anticoagulants are immunoglobulins that interfere with phospholipid-dependent coagulation tests. The screen comprises the following tests: PT, APTT, Fibrinogen assay, AFSL, and DVVT. Anti-Cardiolipin antibodies and B2 glycoprotein 1 are also included as part of the screen if a clotted sample is received.
Samples without Request Form WILL NOT be processed.
Thrombophilia request form FOR-CUH-PAT-1575 includes documentation of patient consent must be received with all requests and is available on the CUH website.

Turnaround: 3 – 4 weeks (Refer to the main Haematology Section on Coagulation).

Report: Reported Positive or Negative

Lyme Serology / *Borrelia burgdorferi* Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood, CSF (1mL)

Comment: **CSF only tested where antibody confirmed in blood.**
If clinically suspicious, the test should be repeated after a month as antibodies take some time to develop.
Serum samples testing positive in house and CSF specimens are sent to a reference laboratory (Rare and Imported Pathogens Laboratory (RIPL), Porton Down).

Turnaround: Negative serum samples: 36 hours
Serum samples positive in house and CSF: 28 working days

Report: Qualitative result

Lymphogranuloma venereum LGV

Laboratory: Microbiology

Specimen: Male Rectal swab. Appropriate PCR STD Specimen Collection and Transport Kits must be used. Please read the kit insert for information on specimen collection and associated limitations.

Comment: Performed by a reference laboratory (Molecular Microbiology, Central Pathology Laboratory, St James Hospital. Dublin 8).
This test is only performed on male rectal specimens that have tested positive for Chlamydia tracomatis and where the patient has the following clinical details:

- HIV positive
- A contact of a known LGV confirmed case
- Symptomatic of LGV

Turnaround: 14 days

Ref. Range: Detected or not detected

Lysosomal Enzymes

Laboratory: Referred from Biochemistry to Willink Biochemical Genetics Unit, St Mary's Hospital, Manchester

Specimen: 5 ml EDTA whole blood

Comment: Express post (M,T,W) Delivery <72hrs
Turnaround: 8 weeks
Ref. Range: See report form

M2 (Pyruvate Dehydrogenase Elisa Test)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Quantitative Elisa. Undertaken automatically on all sera showing specific Anti-Mitochondrial Immunofluorescence on Autoantibody Screen.
Turnaround: 96 Hours
Ref. Range: 0 - 5 IU/ML

Magnesium (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Haemolysis invalidates result
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Ugent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Magnesium (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 Hr collection
Turnaround: 1 Day
Ref. Range: 3.0 – 5.0mmol/24 Hr
Comment Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Malaria PCR, Antigen and Blood Film Screen

Laboratory: Haematology
Specimen: Blood 3mL purple Vacuette® (EDTA) <12 Hours old
Comment: Test available Monday to Friday during routine working hours, and for emergency reasons at all other times. Please notify laboratory when sending request. An immunodiagnostic test is used for the detection of circulating *Plasmodium falciparum* antigens and an antigen that is common to four species of malaria, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *plasmodium malariae* in whole blood. Blood films are examined to confirm presence of same, to identify other forms of Malaria. *P. malariae*, *P. ovale*, *P. falciparum*. *P. vivax* and *P. knowlesi*, also to estimate the percentage of infestation of *Plasmodium falciparum* or *P. knowlesi* if present. Low parasite density may produce a negative result on the antigen screening method. This screening test is not intended for use in screening asymptomatic populations.

Blood films are examined to confirm presence of malaria, to identify the form of Malaria present and also to estimate the percentage infestation.

Note: Where a malaria sample is >4 hrs old when received in the laboratory, a positive screen requires a fresh sample <4hrs old to confirm the species and %parasitaemia.(as per BCSH Guidelines).

Positive samples are referred from Haematology to the Malaria Reference Laboratory, Faculty of Infectious & Tropical Diseases, London School of Hygiene & Tropical Medicine, Keppel Street, LONDON, WC1E 7HT. Please supply history of travel, prophylaxis, previous infections, etc.

Turnaround:	A verbal report is always given on day of sample receipt. Emergency specimens: 4 hours Routine specimens: 2 days Positive samples referred as outlined above: 28 days (phoned report available within 3 working days)
Result:	Negative / Positive (with % Parasitaemia if *P. falciparum* or *P. knowlesi*). Referral report: Sent to referring clinician and copy filed in laboratory

Manganese

Laboratory:	Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford
Specimen:	Sod Hep trace metal free tube (navy top)
Comment:	As manganese is present in stainless steel needles it is necessary to collect a blood sample for manganese after blood has been drawn for other analyses at the same time, otherwise the first 5 ml of blood should be discarded. Alternatively, a plastic cannula or patent line in the patient should be used.
Turnaround:	10 days from receipt in Referral laboratory
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Maturity Onset Diabetes of the Young (MODY)

Laboratory:	Referred from Biochemical Genetics to Exeter Genomics Laboratory
Specimen:	3-5ml EDTA blood
Comment:	Special request form available from https://www.diabetesgenes.org/genetic-test-referral-forms/ Please note: invoices will be issued directly to the referring clinician.
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Measles IgG Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

Measles IgM Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, oral fluid
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Qualitative result

Measles Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, oral fluid, CSF
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Meningitis C Vaccine Antibodies

Laboratory:	Clinical Biochemistry
Specimen:	Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment:	Performed by a reference laboratory (Irish Meningococcal and Meningitis Reference Laboratory, The Children's Hospital, Temple Street, Dublin).

Turnaround:	8-10 weeks
Report:	Positive or negative

Meningococcal PCR

See *Neisseria meningitidis* PCR

Metabolic Screen / Blood (Amino Acid Chromatography)

Laboratory:	Sample referred from Clinical Biochemistry to The Children's Hospital, Temple Street, Dublin
Specimen:	Lithium Heparin sample which must be separated within 30 minutes of collection
Turnaround:	4 weeks
Ref. Range:	See report or contact Biochemistry Laboratory Temple Street Hospital.

Metabolic Screen / Urine

Laboratory:	Sample referred from Clinical Biochemistry to The Children's Hospital, Temple Street, Dublin
Specimen:	Spot urine, transport to Bio lab immediately for the addition of 5% Merthiolate
Comment:	Sample assayed for Creatinine, Protein, Ph, reducing substances, blood, glucose, ketones, mucopolysaccharides, sulphur amino acids, amino acid chromatography, ketoacids (DNPH)
Turnaround:	1 week
Ref. Range:	See report or contact Biochemistry Laboratory, Temple Street Hospital.

Metanephrines (plasma)

Laboratory:	Sample referred from Clinical Biochemistry to Biochemistry Department, Freeman Hospital, Newcastle
Specimen:	2 EDTA blood samples (5-7 mLs) taken 10 minutes apart. Send to laboratory on ice.
Comment:	Consultant request only
Turnaround:	5 weeks

Metanephrines (Urinary)

Laboratory:	Sample referred from Clinical Biochemistry to Biomnis
Specimen:	24-hour urine sample collected into a container (does **not** require acid). 24 hr urine containers are available from stores; Refrigerate during collection. Do not perform sampling during menstruation period. No need of specific diet anymore.
Turnaround:	2 weeks
Ref. Range:	See report form

Methadone

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01) 8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Methaemoglobin

Laboratory:	Clinical Biochemistry
Specimen:	Lithium Heparin syringe
Turnaround:	1 hour 15 mins
Ref. Range:	< 1.5%

Methicillin-Resistant *Staph aureus* (MRSA)

Laboratory:	Microbiology (Main laboratory)
Specimen:	Swabs should be placed in charcoal containing transport media. Use a clean, sterile, leakproof container for CSU and sputum. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Test performed Monday to Friday (cut-off is 1pm). Label all Microbiology forms with MRSA SCREEN. Indicate if the patient was previously MRSA positive. In screening investigations, patient surveillance cultures usually include one swab from both nares, one swab from both axillae and one swab from both sides of groin (3 swabs in all). Swabs from nares, axillae and umbilicus are sufficient for infants and neonates. The anterior nares are the usual site cultured from hospital staff. Occasionally a more extensive screening of staff who are carriers is required e.g. during an outbreak. When MRSA is detected in any microbiological specimen, on completion of treatment rescreen as recommended by national and local guidelines. For electronic orders through the iCM system, one request should be entered for nares, one for axilla and groin (one number, print two labels), and one for any other site that is to be tested.
Turnaround:	Prelim: 24 hours; Final: 24-48 hours
Report:	MRSA not isolated or MRSA isolated. Appropriate sensitivities on new isolates.

Methotrexate (High Dose)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (Gel free clotted sample) Serum samples tested for methotrexate should be protected from light
Comment:	Measured in CUH only on patients with high-dose Methotrexate. Contact Biochemistry laboratory in advance – it is desirable to check the 48hr post dose level on Wednesdays.
Turnaround:	Same day
Ref. Range:	Post high dose Methotrexate levels are measured at 48hr, 72hr and every 24hrs until level is <0.05 µmol/L to guide Calcium Folinate (Leucovorin) rescue therapy.

Microarray Analysis

Laboratory:	Referred from Biochemical Genetics to Clinical Genetics, CHI Crumlin
Specimen:	Adults: 5ml EDTA blood Infants: 2ml min EDTA blood
Comment:	Consent form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/ Please note: invoices will be issued to the referring clinician.
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to Biochemical Genetics

Microsatellite Instability

Laboratory:	Specimen referred from Histopathology to Department of Histopathology, Beaumont, D9
Specimen:	Tissue block
Turnaround:	6 weeks

Mineral Analysis (copper/iron)

Laboratory:	Histopathology
Specimen:	Liver biopsy unfixed
Comment:	Place specimen on filter paper in dry universal container
Turnaround:	4 weeks (specimen is referred to external laboratory)

Mitochondrial Antibodies (Immunofluorescence Test)

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Immunofluorescence assay. Part of Autoantibody Screen. Quantitative Anti-M2 assay automatically undertaken on all immunofluorescence positive sera.
Turnaround:	24 Hours
Ref. Range:	Contact Laboratory

Mitochondrial Genetics

Laboratory:	Referred from Biochemical Genetics to Newcastle Mitochondrial Laboratory
Specimen:	3-5ml EDTA blood
Comment:	Use request form at https://www.newcastle-mitochondria.com/our-science-home-page/diagnostic-document-1/ Please note: invoices will be issued directly to the referring clinician.
Turnaround:	See website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Mitotane

Laboratory:	Referred from Biochemistry to Cardiff Toxicology Laboratory, Cardiff and Vale University Health board
Specimen:	EDTA sample
Comment:	Trough sample >12hr post dose
Turnaround:	4 weeks
Report:	

Molecular genetics for the diagnosis of AML, CML and ALL

Laboratory:	Referred from Haematology to Munich Leukaemia Laboratory (MLL MVZ GmbH), Germany
Specimen:	10-15 ml bone marrow or 10-15 ml bone marrow aspirate/peripheral Blood (EDTA or heparin)
Comment:	Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround:	Up to 21 working days
Report:	Sent to referring clinician and copy filed in laboratory

Monkey pox RNA

Laboratory:	Microbiology (Main laboratory)
Specimen:	Viral swab from vesicle/lesions
Comment:	Microbiology Medical/Infectious Disease Medical/Public Health team must be contacted prior to taking samples Site must be specified as Genital Herpes is a notifiable disease, also report includes HSV1, HSV2, VZV (part of differential diagnosis)
Turnaround:	5 working days
Report:	Detected or Not detected

Mouth Swab

Laboratory:	Microbiology (Main laboratory)

Specimen:	Specimen pus if present otherwise swab any lesions or inflamed areas. A tongue depressor or spatula may be helpful to aid vision and avoid contamination from other parts of the mouth. Swabs should be transported as soon as possible in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request. For possible herpes infection consider a Viral Culture. A separate swab in appropriate viral transport media is necessary.
Turnaround:	Microscopy for Vincent's angina: 24 hours Culture Final: 24-48 hours
Report:	Presence or absence of Vincent's organisms. Culture: Any clinically significant isolate with the appropriate sensitivities.

MSU – Midstream Urine

See Urine Microscopy and Culture or Cytology

MTHFR (Methylenetetrahydrofolate Reductase) C667T Mutation

Laboratory:	Sample referred from Haematology to Eurofins-Biomnis
Specimen:	3.0 mL blood EDTA
Comment:	When the body is deficient in methylenetertahydrofolate reductase its ability to absorb folate is inhibited. Folic acid is essential for red cell production and for the development and health of the foetus and deficiency may lead to hyperhomocystenemia and preeclampsia. A combined request/consent form as part of the new EU GDPR rules is required to be completed and is available on the Eurofins website
Turnaround:	32 days
Result:	Sent to referring clinician and copy filed in laboratory

Mumps IgG Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

Mumps IgM Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, oral fluid
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Qualitative result

Mumps Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Oral fluid, throat swab, CSF, urine
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Muscle Biopsy

Laboratory:	Neuropathology
Specimen:	Fresh Muscle (universal precautions)
Comment:	The muscle biopsy must be at least 1.5cm x 1.5cm x 1.5cm in size. For certain suspected metabolic or mitochondrial disorders, a larger sample may be required for molecular or biochemical analysis. Please contact the Neuropathologist to discuss the case in advance.

The biopsy should be sent immediately FRESH to the Neuropathology Department. Universal safety precautions for fresh tissue should apply.
For specimens which have to be sent over a distance (e.g. Mercy, Bantry, Mallow, Limerick etc.) the biopsy can be wrapped in clingfilm to avoid drying out during transport. Telephone 021 4922519 to let us know that the biopsy is en route. The biopsy should be delivered directly to a staff member in the Neuropathology Dept. Please pack sample according to Packing Instruction 650. Taxi driver/courier should be instructed not to leave specimen at laboratory reception and also instructed in how to deal with spillages. The muscle biopsy should reach the department by 4.00pm. On receipt of the specimen a staff member will telephone the referring hospital laboratory to confirm that the tissue has arrived safely.
Muscle histochemistry is performed in batches once weekly, on Wednesdays. The biopsy can be taken on any day and sent to arrive in the Neuropathology Department no later than 4.00pm.
Additional information is available in the protocol for muscle biopsy (available from the Neuropathology Dept.).

Turnaround: Approximately 3 weeks

Muscle Mitochondrial Enzyme and Genetic Analysis

Laboratory:	Neuropathology
Specimen:	Frozen Muscle
Comment:	Please refer to muscle biopsy protocol above. Specimens sent to Newcastle Mitochondrial NCG Diagnostic Service, Newcastle Upon Tyne, UK.
Turnaround:	3- 4 months.

Mutation analysis for inherited bleeding disorders, Haemophilia carrier testing for direct mutational detection, mutation analysis for inherited Factor VIII or Factor IX deficiency

Laboratory:	Referred from Haematology Dept. to Haemostasis Molecular Diagnostics (HMD), National Coagulation Laboratory, Centre for Clinical and Laboratory Medicine, CPLM, St James Hospital, Dublin 8
Specimen:	Min x 2 EDTA, 6-20 ml
Comment:	Contact Coagulation Medical Team at 01 4162141 Counselling and consent required before testing Samples must be received in the laboratory within 7 days of phlebotomy
Turnaround:	120 working days but can vary depending on gene
Report:	Sent to referring clinician and copy filed in laboratory

Mycobacteria Testing

Laboratory: Microbiology (TB Laboratory)

Specimen Types

- Sputum – Collect early in the morning on at least 3 consecutive days. Sputum should be expectorated from the lower respiratory tract by deep coughing. Preferably, collect a minimum volume of 5mL per specimen. Saliva and postnasal secretions are not suitable. Specimens collected on 3 consecutive days should not be pooled. This may be important if Mycobacteria other than *Mycobacterium tuberculosis* are isolated as interpretation is based on repeated isolation.
- Bronchial washings – Minimum specimen size is preferably 5mL.
- Urine – Only processed after prior consultation with Microbiology Medical Team. Collect early morning urine on 3 consecutive days. A minimum volume of 20mL is desirable.
- Gastric lavage fluid – Only processed after prior consultation with Microbiology Medical Team. Collect samples only on Monday to Friday. Collect early in the morning (before breakfast) on 3 consecutive days. Preferably, collect a minimum volume of 5mL per specimen. If the samples are not delivered promptly to Microbiology, gastric acid present in sample will render them useless for processing. Deliver samples straight to the Microbiology laboratory by 9.00am.
  Gastric lavage samples must be accompanied by a Handwritten Green Microbiology request form. Gastric lavage samples should not be ordered through iCM.
- Blood Culture for Mycobacterial investigation – Only processed after prior consultation with Microbiology Medical Team. Please contact the TB laboratory first as specific bottles for TB culture are available from the laboratory on request (ext. 22823), (Mallow General Hospital, Bantry General Hospital and Mercy University Hospital laboratories must contact the Microbiology medical team on ext 22500/20120 to request bottles for sampling). Blood is added directly to the culture bottles (1-5mL of blood or marrow, between 3 and 5 mls preferred). The culture bottles should be transported immediately to the laboratory; Samples processed Monday to Friday 9-5.
- Bone marrow is added directly to the culture bottles; see procedure for blood above.
- CSF, body fluids, aspirates, pus – Collect aseptically as much as possible into a sterile container. Preferably, a volume of 5-10mL of CSF is required.
- Skin / tissue biopsy / post-mortem specimens – Collect aseptically into a sterile container without preservative. Select a caseous portion if possible. The majority of organisms will be found in the periphery of a caseous lesion. As large a specimen as possible should be sent. Microscopy is generally not performed on swabs.

Comment: Microscopy and culture performed routinely Monday to Friday 9-5pm. If smear results are desired on the same day that the specimen is submitted, the specimen should reach the laboratory before 3pm and the TB laboratory notified.
For the initial diagnosis of mycobacterial infection all specimens should be fresh and taken when possible before anti-tuberculosis treatment is started.
Specimens should be transported as soon as possible.
Specimens other than blood should be refrigerated if transport to the laboratory or specimen processing is delayed for more than 1 hour.
For body fluids use a sterile, leakproof, disposable plastic container.
Swabs should be transported in Amies transport medium with charcoal.
Laryngeal swabs are not recommended and only be used when pus or sputum is unobtainable.
Isoniazid, rifampicin, ethambutol Pyrazinamide and streptomycin susceptibility testing performed in IMRL, St James' Hospital.

Turnaround: Microscopy: 24-72 hours
Culture: 6-8 weeks
Positive smear and culture results are telephoned to requesting clinician.

Report: Microscopy: Acid-Alcohol fast bacilli not seen or seen with enumerator

	Culture:	Culture for mycobacterium negative or mycobacterium species isolated with sensitivities where appropriate

Mycology – Fungal Microscopy and Culture (Dermatophytosis – skin, hair, nails)

Laboratory:	Microbiology (Mycology section)	
Specimen:	Scalp specimens are best obtained by scraping with a blunt scalpel. The contents should include hair stubs, the contents of plugged follicles and skin scales. Hair may also be plucked from the scalp with forceps (infected hairs are usually easy to remove in this way). Cut hairs are unsatisfactory as the focus of infection is usually below or near the surface of the scalp. Nail clippings should be taken from any discoloured, dystrophic or brittle parts of the nail. These should be cut as far back as possible from the free edge of the nail and include its full thickness, scrapings can also be taken from beneath the nail to supplement the clipping specimen. Skin specimens should be collected by scraping outwards from the edges of the lesions, with either a blunt scalpel blade or with the edge of a glass microscope slide. The edge of the lesion is where there is likely to be the most fungus.	
Comment:	Some general points on specimen collection are given below: It is often helpful to clean the lesions of the skin or scalp (and sometime nail) with surgical spirit or 70% alcohol prior to collection of specimens as this improves the chances of detecting the fungus by microscopy and also reduces the likelihood of contamination of subsequent cultures. Prior cleaning is essential if greasy ointments or powders have been applied to the region. Transport at room temperature. Do not use fixatives. All specimens should be collected and transported in a properly labelled, sealed sterile container i.e. universal containers, Mycological Transport Pack or glass slides in the appropriate slide holder. Loose slides should not be used. The use of clear sticky tape (sellotape) is not recommended. **Important note:** If you clinically suspect Hendersonula toruloidea which causes dermatophyte-like lesions of the palms, soles and toe-webs or *Tinea nigra*, which is a rare condition which causes dark pigmented areas, usually on the skin of the palm, and is clinically distinctive from dermatophyte lesions, please inform the laboratory when sending skin samples for analysis.	
Test method:	Keratinised tissues are treated with potassium hydroxide in the laboratory to detect hyphae of dermatophytes. Many pathogenic fungi will grow slowly on conventional media but may be recovered more reliably on special fungal media, which require incubation for up to 4 weeks. Some isolates may require referral to the Mycology Referral Laboratory in Bristol for identification and/or susceptibility testing which can take up to an additional 4 weeks.	
Turnaround:	Direct smear:	1 week.
	Culture:	1-3 weeks
Report:	Direct smear:	Fungal elements seen or not seen. Typical microscopic appearance indicates fungal infection but does not identify the particular fungal species. Culture of yeast or fungus provides species identification. Positive microscopy is diagnostic for a fungal infection, however a negative microscopy result does not exclude a diagnosis of fungal infection.
	Culture:	Fungus not isolated or organism name isolated

***Mycoplasma genitalium* RNA**	
Laboratory:	Microbiology (Main Lab)
Specimen:	Genital swab /Urine collected using Aptima collection device available from the NVRL,
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Test
Turnaround:	14 days
Report:	Detected or Not Detected

***Mycoplasma pneumoniae* IgM**	
Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Test is validated only for patients less than or equal to 20 years of age.
Turnaround:	14 days
Report:	Qualitative result

Mycophenolic Acid (Mycophenolate)	
Laboratory:	Sample referred from Clinical Biochemistry to Harefield Hospital
Specimen:	0.5ml Plasma EDTA, pasma needs to be separated within 6 hours.
Comment:	12 hour trough level
Turnaround:	6 weeks
Therapeutic Range:	Interpretation of Mycophenolic Acid is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement

Myeloperoxidase Antibodies	
Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Quantitative Elisa
Turnaround:	72 Hours
Ref. Range:	0 - 20 AU/mL

Myoglobin	
Laboratory:	Sample referred from Clinical Biochemistry to Sheffield Northern General's Protein Reference Unit Diagnostic Service
Specimen:	2 ml serum or 2 ml urine
Turnaround:	3 weeks
Ref. Range:	See report form

Neisseria gonorrhoea PCR

Laboratory:	Microbiology
Specimen:	Nucleic acid amplification method. Appropriate PCR STD Specimen Collection and Transport Kits must be used. Please read the kit insert for information on specimen collection and associated limitations.
Comment:	Test available Monday to Friday 9-5pm. Specimens received for Neisseria gonorrhoea PCR will also be tested for *Chlamydia trachomatis* DNA. The assay is verified for use with female Endocervical swab specimens, High Vaginal Swab specimens and male/female Urine specimens. The preferred specimen type for *N. gonorrhoea* testing in female patients is urine due to increased sensitivity and fewer problems during specimen processing. Underfilled or overfilled Urine specimen containers are unsuitable for testing. Endocervical/HVS specimen tubes with no swab or with two swabs cannot be tested. Use only flocked swabs for Endocervical sampling (this is the thinner of the 2 swabs in the sample collection kit). Woven swabs from Endocervical sites are not processed. Use woven swabs provided for all other sites, other than Endocervical sites. Specimens that appear bloody or have a dark brown colour are unsuitable for testing (may give false negative results). The presence of mucous may inhibit PCR and cause false negative test results. Mucous free specimens are required for optimal test performance. Do not use collection devices beyond their expiry date.
Turnaround:	96 – 120 hour
Report:	RT: PCR *Neisseria gonorrhoea* Target Not Detected or Target Detected. A Target Not Detected result does not automatically exclude infection from *Neisseria gonorrhoea* as the level of DNA present may be lower than the limit of detection of the assay. The assay is only verified for use with female Endocervical/HVS swab specimens and male/female Urine specimens. Results from other specimen types should be interpreted with caution.

Neisseria meningitidis PCR

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	1mL EDTA blood, CSF (0.5mL)
Comment:	Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin
Turnaround:	10 working days. Samples received by IMSRL before 11am, verbal result between 4pm and 5pm the same day (positive only).
Report:	Detected or not detected

Nerve Biopsy

Laboratory:	Neuropathology
Specimen:	Fresh nerve (universal precautions)
Comment:	Please refer to the nerve biopsy protocol (Neuropathology Information for Users). The biopsy site should be chosen by the primary care physician. In general, the sural nerve is the most frequently biopsied nerve. A fascicular or complete nerve biopsy can be done. In practice approximately two centimetres of the entire nerve including the perineurium is cut. The laboratory should be notified in advance that a nerve biopsy is en route. It should be sent immediately FRESH to the Neuropathology Dept. Universal safety precautions for fresh tissue should apply. For specimens which have to be sent over a distance (e.g. Bantry, Mallow etc.) the biopsy can be wrapped in gauze lightly moistened with NORMAL SALINE, to keep moist during transport. Telephone ext 021 4922519 to let us know the biopsy is en route. The biopsy should be delivered directly to a staff member in the Neuropathology Dept. Sample should be packed according to Packing Instruction 650. Taxi driver/courier should be instructed not to leave specimen at laboratory reception and also instructed in how to deal with spillages. The nerve biopsy should reach the department by 4.00pm. On receipt of the specimen a staff member will telephone the referring hospital laboratory to confirm that the tissue has arrived safely. Please indicate on the Neuropathology request form the clinician to whom the result should be sent and if a copy is needed for another clinician. The primary care team should fill out the clinical details on the request form before the patient goes to theatre. For any further queries please contact the Neuropathology laboratory (021 4922519) or Dr Bermingham (021 4920475).
Turnaround:	3 weeks. Certain cases may take longer.

Neuroblastoma Screen (Catecholamines and Metanephrines)

Laboratory:	Sample referred to Beaumont Hospital, Dublin
Specimen:	Fresh spot urine (20 mL, if possible). MUST be acidified in lab within 10 minutes of collection.
Comment:	Please notify the Biochemistry laboratory in advance. State what drugs the patient (<16years) is on during collection.
Turnaround:	3 weeks
Ref. Range:	Contact CUH Clinical Biochemistry Laboratory

Neuromuscular genetics (HNPP, CMT, DM, DMD, FA, SCA etc)

Laboratory:	Referred from Molecular Genetics lab in Biochemistry to NCMG
Specimen:	3ml EDTA blood
Comment:	Contact 22531 for further information Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.
Turnaround:	See website: www.genetics.ie
Report:	Sent to referring clinician and copy of report filed in pathology

Neurosurgical Biopsies (Routine)

Laboratory:	Neuropathology
Specimen:	Formalin-fixed tissue
Turnaround:	5 days

Neurosurgical Biopsies (High-Risk)

Laboratory:	Neuropathology
Specimen:	Formalin-fixed tissue
Comment:	Special precautions are required for investigation of atypical dementia and other high-risk, infectious cases. Biohazard labels must be used. Contact the Neuropathologist on duty (22520). N.B. Suspected prion disease cases are examined in the CJD surveillance centre in Beaumont Hospital 01 8377755
Turnaround:	N/A, case dependent

Next Generation Sequencing (cfTNA Plasma)

Laboratory:	Molecular Pathology: Next Generation Sequencing cfTNA Plasma Molecular testing in the pathology laboratory CUH is performed on request from Consultant Histopathologists on plasma samples from patients with Lung cancer. The cut-off for receipt of these samples into the laboratory is 15:00
Specimen:	2 K2 EDTA Blood tubes (must reach lab within 4 hours) OR at least 1 Roche cfDNA blood tube
Comment:	Please contact the laboratory prior to taking the sample at Ext.22513 /22792 Once taken, deliver to the molecular pathology laboratory immediately and **hand directly to the Medical Scientist**.
Turnaround:	5-10 working days

Norovirus – Norwalk-like viruses (NLV) /Small Round Structured Viruses (SRSV)

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	A fresh liquid faeces specimen is essential. 1-2mL is sufficient.
Comment:	Test not routinely available. Test seasonally available in-house, otherwise test will be referred to external laboratory. Please discuss with the Microbiology Medical team if required. Urgent Norovirus testing available with prior approval from Medical Microbiology team A Target Not Detected result does not automatically exclude infection from the above enteric pathogen as the level of DNA present may be lower than the limit of detection of the assay.
Turnaround:	In-house: 5 working days; External referral: 2 weeks.
Report:	Target Detected or Target Not Detected for Norovirus.

Nose Swab

Laboratory:	Microbiology (Main laboratory)
Specimen:	Specimen anterior nares gently rotating the swab on the surface. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Processed routinely on <12 years or with relevant clinical details (recurrent boils, infected eczema, impetigo or renal patients). Aerobic culture – To detect nasal carriage of bacteria, especially *Staphylococcus aureus* during an outbreak of staphylococcal infection. Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Prelim: 24 hours; Final: 48-72 hours
Report:	Presence of *Staphylococcus aureus* usually reflects carrier state.

NRBCs

Laboratory: Haematology
Specimen: Blood 3mL purple Vacuette® (EDTA)
Paediatric (1mL purple (EDTA) or 1.3 mL red)
Note: 6ml purple EDTA Vacuette or any other sample type is unsuitable for NRBCs.
Blood Films are made in the laboratory as required.
Comment: Please refer to section: Full Blood Count including automated WBC DifferentialBlood Films for Manual White Cell Differentials, Slide Platelets and Red Cell Morphology (peripheral blood smear)

Oestradiol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Oncotype DX Testing

Laboratory: Referred from Pathology to Genomic Health Inc., California
Specimen: FFPE tissue block
Turnaround: 20 working days (from date testing material is sent to referral institution)

Ophthalmic Biopsies

Laboratory: Neuropathology
Specimen: Formalin fixed tissue
Turnaround: 5 days

Ophthalmic Biopsies – corneal smears (acanthamoeba)

Laboratory: Neuropathology
Specimen: Corneal scrape – special fixative required, (CytoLyt), available from Neuropathology.
Comment: Please contact Neuropathology Department in advance on 4922520
Turnaround: 1-2 days

Opiates

Laboratory: Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen: Spot urine
Comment: See Toxicology / Drug Screen
Turnaround: 1 week
Ref. Range: See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Organic Acids

Laboratory: Sample referred from Clinical Biochemistry to The Children's Hospital, Temple Street, Dublin
Specimen: Spot Urine
Comment: Sample must be frozen immediately
Turnaround: 8 weeks
Ref. Range: See report or contact Biochemistry Laboratory Temple Street Hospital

Osmolality (Serum)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 24 Hours

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Osmolality (Urine)

Laboratory: Clinical Biochemistry
Specimen: Spot urine sample
Turnaround: 24 Hours
Ref. Range: Dependant on the patient's state of hydration

Ovarian Antibodies

Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround: Approx. 3 Weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Oxidative Burst analysis

Laboratory: Specimen referred directly from ward (through Stores department) to Haematology, Our Lady's Hospital Crumlin
Specimen: Blood 3mL, purple, Vacuette® (EDTA)
Specimen must reach referral laboratory within 3 ½ .hours of phlebotomy, and delivery is organised with Stores Department to be sent by taxi at 8.00 am. Sample msut be taken between 07:30 and 08:00
Comment: Requested by Consultant Haematologist
Turnaround: 3 weeks
Report: Sent to referring clinician and copy filed in laboratory

PAI-1 (Plasminogen Activator Inhibitor)

Laboratory: Sample referred from Haematology to Eurofins-Biomnis
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x 3 fill to mark on tubes
Comment: Request must be booked in advance with the Haematology Laboratory CUH. (PAI-1) is an important component of the coagulation system that down-regulates fibrinolysis in the circulation. Reduced PAI-1 levels may result in increased fibrinolysis and an associated bleeding diathesis.
A combined request/consent form as part of the new EU GDPR rules is required to be completed and is available on the Eurofins website
Turnaround: 40 working days
Report: Sent to referring clinician and copy filed in laboratory

Paracetamol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in or plain tube (clotted sample)
Comment: Sample 4 – 12 Hours post ingestion
Turnaround: 1 Hour 30 mins
Ref. Range: Interpretation of Paracetamol toxicity is highly dependent on time of putative overdose. Refer to nomogram

Paraneoplastic screen (See anti-neuronal antibodies)

Parasitology (enteric) – Ova, Cysts and Parasites (OCPs)

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	Fresh faeces specimen in a sterile leak-proof container. Do not refrigerate or incubate specimens. Three examinations spaced 2-3 days apart are recommended for best recovery of parasites. Unless the patient has severe diarrhoea or dysentery, no more than one specimen should be examined within a single 24-hour period, as shedding of cysts and ova tends to be intermittent. If *Entamoeba histolytica* or *Giardia lamblia* are suspected and the first 3 specimens are negative, ideally 3 additional specimens should be submitted at weekly intervals. *Note:* Fresh specimens are essential for the examination of trophozoites. Transport specimens ASAP. Protozoan trophozoites will not survive if the specimen dries out. Cysts will not form once the specimen has been passed.
Comment:	Full clinical details are essential. Faeces specimens from patients with chronic diarrhoea, patients with a history of foreign travel, immunocompromised patients or FMT (Faecal Microbiota Transplant) patients will be processed. If in doubt, please contact the medical staff. Please indicate if specific organisms are sought. Specifically indicate on the request form if Cyclospora or Microsporidia are sought. Oocysts of *Cryptosporidium* spp. Can be identified with special staining techniques; (*Cryptosporidium parvum/hominis* detected via molecular techniques in faeces) their presence may indicate active infection or carriage.
Turnaround:	7 working days
Report:	OCP not seen or a report on any parasites seen. The presence of white or red cells is significant and indicates mucosal inflammation. Diagnosis of amoebic colitis requires the presence of *Entamoeba histolytica* trophozoites containing ingested red cells. Cysts or trophozoites of *Giardia intestinalis* confirm a diagnosis of giardiasis. The presence of characteristic ova can identify infection with hookworms and other roundworms (nematodes) e.g. *Enterobius vermicularis* in sticky tape preparations, *Ascaris lumbricoides*; flat flukes (trematodes) e.g. *Fasciola hepatica*, tape worms e.g. *Taenia saginata*, *Taenia solium*. Occasionally complete worms are passed, enabling specific identification of the adult worm.

Parechovirus Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Respiratory secretions, stool, CSF
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Parvovirus B19 IgG and IgM

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

PCP (Pneumocystis jirovecii)

Laboratory:	Histopathology (Cytology Department)
Specimen:	Bronchial lavage (neat or in cytolyt)
Comment:	Tests are performed routinely Monday to Friday during routine working hours
Turnaround:	Samples can be processed as urgent with prior communication with laboratory.
Ref. Range:	Not applicable

PCP (Pneumocystis jirovecii)

Laboratory:	Microbiology
Specimen:	Sputum or Brochial lavage (BAL)
Comment:	Test performed by National Virus Reference Laboratory (NVRL), Dublin
Turnaround:	28 working days

Penile swab

Refer to Genital swab

Pericardial Fluid / Peritoneal Fluid / Pleural Fluid

See Sterile Body Fluid – Microscopy and Culture

Perinatal: Placenta, Products of Conception, Ectopic Pregnancies

Laboratory:	See formalin fixed histopathology speciments.

Peritoneal Dialysis Fluid

See Continuous Ambulatory Peritoneal Dialysis Fluid

Pernasal Swab /Pertussis

See *Bordetella* species – Culture

PFA 100 (Platelet Aggregation Screen)

Laboratory:	Haematology
Specimen:	Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x2. Specimens must be sent to the Haematology Lab. Within 2 hours of collection. Samples must not be sent in the pneumatic tube system. Patients on aspirin are unsuitable for this test. Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling Specimens with platelet counts <150 x 10^9/l are unsuitable for testing.
Comment:	Test available Mon-Fri before 4pm hours **by arrangement** with the Haematology dept. The process of platelet adhesion and aggregation following a vascular injury is simulated in vitro, based on change in vacuum /pressure brought about by platelet plug formation. The most common causes of platelet dysfunction are related to uremia, von Willebrand disease and exposure to agents such as acetyl salicylic acid.
Turnaround:	8-24 hours
Ref. Range:	Collagen/Epinephrine 82 – 150 secs Collagen/ ADP 62 – 100 secs

Phaeochromocytoma & Paraganglioma NGS Gene Panel

Laboratory:	Referred from Biochemical Genetics to Exeter Genomics Laboratory
Specimen:	3-5ml EDTA blood
Comment:	Request form availiable at https://www.exeterlaboratory.com/wp-content/uploads/SWGLH-Genomic-Test-Request-Form-v1.3.pdf Please note: invoices will be issued directly to the referring clinician.
Turnaround:	See referral laboratory website.
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Phencyclidine

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Phenobarbitone / Phenobarbital

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent
Turnaround:	4 Days. Urgents on request.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Phenotyping Red Cell Antigens

Laboratory:	Blood Transfusion Laboratory
Specimen:	1 X 6 mL EDTA Pink Capped Tube
Comment:	Phenotypic analysis of patient red cell antigens (e.g. male partners of antenatal patients found to have developed red cell antibodies during pregnancy in the prediction of HDNB) Complete the Blood Transfusion or Antenatal Serology request forms LF-C-BTR-XMATCH or LF-C-BTR-ANTENAT. This is an INAB accredited test.
Turnaround:	3 Hours
Ref. Range:	Not Applicable

Phenytoin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent
Turnaround:	1 Day. TAT for routine GP requests is 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Phosphate (Blood)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Haemolysis invalidates result
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Phosphate (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	24 Hour urine collection, to be acidified as soon as possible in laboratory.
Turnaround:	1 Day
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Pinworm

See Enterobius vermicularis

Platelet Aggregation Tests

Laboratory: Haematology

Specimen: Six (minimum) Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Samples **must not** be sent in the pneumatic tube system.
Specimens must be sent to the Haematology Lab. within 2 hours of collection.
Limitations: Patients on aspirin are unsuitable for this test.
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Specimens with platelet counts <150x109/l are unsuitable for testing.

Comment: Test available Mondays only, **by prior arrangement** with the Haematology dept. The process of platelet adhesion and aggregation following a vascular injury is simulated in vitro, and the platelets aggregates, which form as a result of being exposed to collagen, ristocetin, ADP and adrenaline, are detected by changes in light transmittance. The most common causes of platelet dysfunction are related to uremia, von Willebrand disease and exposure to agents such as acetyl salicylic acid.

Turnaround: 8-24 hours,

Report: Reported as Normal / Reduced / No Response / Inconclusive

Platelet Antibody Investigation

Laboratory: Blood Transfusion Laboratory

Specimen: 1 x 4 ml Clotted sample (red cap with yellow ring).

Comment: Referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8.
Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH
This is not an INAB accredited test.

Turnaround: 3 weeks

Ref. Range: Not applicable.

Pneumococcal Antibodies (IgG)

Laboratory: Clinical Biochemistry

Specimen: Blood 4mL red top Vacuette® (or similar container for clotted blood)

Comment: Test performed by reference laboratory (HPA Laboratory, Manchester).

Turnaround: 2-3 weeks

Report: Refer to specific laboratory report

Pneumococcal PCR

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 1mL EDTA blood, CSF (0.5mL)

Comment: Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin

Turnaround: 10 working days. Samples received by IMSRL before 11am, verbal result between 4pm and 5pm the same day (positive only).

Report: Detected or not detected

PNH Paroxysmal nocturnal haemoglobinuria

Laboratory: Referred by Haematology to Haematology, St James Hospital, Dublin 8

Specimen: Blood 3mL x 2, purple Vacuette® (EDTA).

Comment: Test available Monday to Wednesday, before 12.00 noon. PNH is characterised by intermittent intravascular haemolysis due to hypersensitivity of RBC'S to the haemolytic action of complement caused by the lack of proteins DAF and MIRL. Diagnosis is possible by using monoclonal antibodies where the abnormal RBC population is identified by agglutination technique.

Turnaround:	Positive results phoned within 24 hours of receipt of result, printed reports in 60 working days
Report:	Sent to referring clinician and copy filed in laboratory
	No evidence of PNH Clone/PNH Clone detected

Polio Antibodies

Laboratory:	Clinical Biochemistry
Specimen:	Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment:	Test performed by reference laboratory (Respiratory Infections Laboratory, Colindale, London).
Turnaround:	4 weeks
Report:	Quantitative report with an interpretative comment.

Porphyrin Screen

Laboratory:	Sample referred from Clinical Biochemistry to St. James Hospital Dublin	
Specimen:	Spot urine sample	EDTA whole blood sample
	Faeces sample	Lithium Heparin plasma sample
Comment:	All samples must be protected from light at all times using tinfoil	
Turnaround:	3weeks	
Ref. Range:	See report or contact Biochemistry Dept. St James' Hospital	

Post-Mortems

See Autopsies/Post-Mortems Section 3.5 Dept. of Pathology

Potassium (Blood)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Haemolysis invalidates result
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Potassium (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot or 24 Hr sample
Turnaround:	1 Day
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Pouch of Douglas Fluid

See Sterile Body Fluid – Microscopy and Culture

Prader Willi Syndrome (PWS)

Laboratory:	Referred from Biochemistry to Clinical Genetics, CHI Crumlin
Specimen:	Infants: 1ml EDTA blood
	Adults 3-5ml EDTA blood
Comment:	Request form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Turnaround:	Check CHI website
Report:	Sent to referring clinician and copy scanned in biochemical genetics

Pregnancy Tests

Laboratory:	Haematology
Specimen:	Fresh Urine Specimen (must be <48 hrs old, preferably refrigerated), early morning specimen recommended.

Comment:	Urine tests for confirming pregnancy are based on detecting elevated levels of human chorionic gonadotropin (HCG) which the placenta begins to produce in increasing amounts about 10 days after fertilisation. Test available Monday to Friday during routine working hours and for emergency reasons at all other times.
Turnaround:	Emergency specimens: 30 minutes Routine specimens: 8 – 24 hours
Report:	Positive, Negative or Inconclusive

Procalcitonin

Laboratory:	Clinical Biochemistry
Specimen:	Serum. Appropriate clinical details essential. No special patient preparation needed. When monitoring patients use the same specimen collection tube type throughout the evaluation
Turnaround:	Same day
Ref. Range:	Refer to PCT Interpretation Guidelines.

Progesterone

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample). For evidence of ovulation draw blood 7 days prior to expected day of menstruation. Confirm correctness of timing at subsequent menses.
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Prolactin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Propoxyphene

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	Spot urine
Comment:	See Toxicology / Drug Screen
Turnaround:	1 week
Ref. Range:	See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Protein (Total)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges. Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Protein (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot or 24 Hr sample
Turnaround:	1 Day

Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Protein C

Laboratory: Haematology

Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Test available Monday to Friday during routine working hours, and for emergency reasons **by arrangement.** In this assay the Protein C present in the test plasma is activated by an enzyme, this in turn hydrolyses a chromogenic substrate which is then measured. Decreased levels are reported in congenital abnormalities, also in patients with hepatic disorders, those receiving oral anticoagulants and in cases of DIC. Congenital abnormalities often result in severe recurrent venous thrombosis. This assay forms part of the Thrombophilia screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Samples must be received within 4 hours of phlebotomy
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.

Turnaround: Routine specimens: 3 – 4 weeks
(Refer to the main Haematology Section on Coagulation).

Ref. Range:

Age	Mean (%)	Range (%)
Day 1	35	17 – 53
Day 5	42	20 – 64
Day 30	43	21 – 65
Day 90	54	28 – 80
Day 180	59	37 – 81
Adult	95	70 – 120

Protein S

Laboratory: Haematology

Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Comment: Test available Monday to Friday, during routine working hours. Protein S is a vitamin K dependent protein, which serves as a co – factor for the anticoagulant activity of activated protein C in the degradation of factors V and VIII. This assay forms part of the Thrombophilia screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Samples must be received within 4 hours of phlebotomy
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.

Turnaround: 3 – 4 weeks

Ref. Range:

Age	Range
Day 1	12-60%
Day 5	22-78%
Day 30	33-93%
Day 90	54-118%
Day 180	55-119%
Adult male	68% - 139%
Adult female	60 – 114 %

Protein/Creatinine Ratio (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot urine
Turnaround: 1day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Prothrombin DNA Mutation Studies (G20210A)

Laboratory: Haematology Molecular Genetics
Specimen: Blood 3mL purple Vacuette® (EDTA)
Comment: Forms part of a Thrombophilia screen.
Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website.
Turnaround: 6 – 8 weeks
Report: (Negative/Positive-Heterozygous /Homozygous), see final report

Prothrombin Time (PT)

Laboratory: Haematology
Specimen: Blood 3mL, blue Vacuette® (sodium citrate 3.2%)
Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).
Comment: Test available Monday to Friday, during routine working hours and for emergency reasons at all other times.
The test is used as a screen to detect (a) single or combined deficiencies of the extrinsic coagulation system, (b) liver disease (c) vitamin K deficiency (d) monitoring oral anticoagulants, I assaying the specific coagulation Factor II. It also forms part of the Thrombophilia and/or Lupus screen.
Specimens must be received within 48hrs of phlebotomy
Many commonly administered drugs may affect the results. This should be kept in mind especially when unusual or unexpected results have been obtained.
'The prothrombin time (measured in seconds) is a very sensitive test to advancing liver disease in patients with liver disorders. The PT ratio – the patients PT over the midpoint of the normal range is useful. The laboratory recognises that some protocols dealing with liver disease and paracetamol overdose use the INR. This is a less sensitive measure of liver disease as it is adapted for patients on warfarin.
Turnaround: Urgent specimens: 2 hours Wards: 8 hours GPs: 24 hours
Ref. Range:

Age	Mean	Range (seconds)
Day 1	13.0	10.1 – 15.9
Day 5	12.4	9.5 – 15.3
Day 30	11.8	9.3 – 14.3
Day 90	11.9	9.6 – 14.2
Day 180	12.3	10.7 – 13.8
Adult	See final report	

PSA Total

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

PTH

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL EDTA plasma
Turnaround: 1 week
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Purines & Pyrimidines

Laboratory: Referred from Biochemistry to the Purine Research Lab, St. Thomas's Hospital, London
Specimen: Spot Urine (5-10mls) on ice – must be frozen immediately.
EDTA blood (2-5mls)
Comment: Consultant request only
Turnaround: 5 Weeks

Pyruvate Kinase

Laboratory: Sample referred from Haematology to The Red Cell Centre, King's College Hospital, London, SE5 9RS Westminister Bridge Rd., London0044 2032 999000
Specimen: Blood 3mL, purple Vacuette® (EDTA), minimum 1 mL.
Comment: Request must be booked in advance with the Haematology Laboratory CUH, performed as part of the investigations into haemolytic anaemias.
Turnaround: 60 days
Report: Sent to referring clinician and copy filed in laboratory

Q Fever

See *Coxiella burnetii* IgG and IgM

QuantiFERON®-TB Gold Plus test (QFT)

Laboratory: Microbiology (TB Laboratory)
Specimen: Special kit available from the Microbiology Laboratory after prior agreement with medical team. Please follow the manufacturers instructions supplied with the kit.
Note:
1. Fill to black mark on tube; under or overfilled bottles are not accepted. Immediately after filling tubes shake 10xtimes; just firmly enough to ensure the entire inner surface of the tube is coated with blood to dissolve antigens on tube walls.
2. Hand-write patient details on tubes.
3. Return the complete kit (in box) accompanied by a green Microbiology request form.

Comment: Errors in collecting or transporting blood specimens can decrease the accuracy of QFT. Do not refrigerate the kit at anytime. Blood specimens must be processed as soon as possible after collection while white blood cells are still viable. Before the QFT is conducted, confirm arrangements for testing with the laboratory.
QuantiFERON®-TB Gold Plus test (QFT) - Specimens are only accepted by this laboratory Monday to Thursday before 4pm (excluding Bank Holidays). All samples received after this time will not be processed. Samples are also not accepted any day preceding a Bank Holiday (i.e. February bank holiday & St. Patricks day)
Test performed by reference laboratory (Eurofins Biomnis, Sandyford Industrial Estate).
Turnaround: 2 Weeks

Report:	Positive (≥0.35), negative (<0.35) or indeterminate. A positive result suggests that *M. tuberculosis* infection is likely; a negative result suggests that infection is unlikely; and indeterminate result suggests QFT-G results cannot be interpreted as a result of low mitogen response. A positive result does not distinguish between active and latent infection. A repeat will be requested where samples are close to 0.35 cut-off.

R90 gene panel for Inherited Coagulation bleeding, Thrombotic and Platelet Disorders

Laboratory:	Referred from Haematology to Oxford Regional Genetics Laboratories
Specimen:	2-5 ml peripheral blood (EDTA)
Comment:	Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround:	Urgent 21 working days/Routine (non-urgent) 84 working days
Report:	Sent to referring clinician and copy filed in laboratory

Renal Biopsy

Laboratory:	Histopathology (Renal Pathology/Electron Microscopy Department)
Specimen:	Renal Biopsy (unfixed tissue)*****
Comment:	Specimens are accepted Mon – Fri 8am to 3:30pm. It is essential to inform the laboratory in advance of the date and approximate time of the procedure at Ext.21315. On the day of the procedure, the specimen container for the biopsy is collected from the EM/Renal laboratory. This consists of a universal container with filter paper soaked in Phosphate Buffered Saline, into which the tissue is placed directly after the procedure. The tissue is then brought to the Renal/EM department, where it is handed directly to a medical scientist. The specimen is divided into portions for Light Microscopy, Direct Immunofluorescence Microscopy and Electron Microscopy in the EM/Renal Lab. *****Note: All Renal Transplant biopsies are processed in-house and slides/images are then referred to Beaumont for reporting.
Turnaround:	80% of clinically urgent cases verbally reported in 2 days 80% of all cases fully authorised in 2 weeks 8 weeks for renal transplant case referred to Beaumont

Renal Stone

Laboratory:	Sample referred from Clinical Biochemistry to the Mater Hospital Dublin.
Specimen:	Renal Stone
Comment:	Renal Stone assayed for NH4, Uric acid, Cystine, CO_2, Oxalate, Calcium, Phosphate, Magnesium
Turnaround:	1 month
Ref. Range:	See report or contact Biochemistry Dept. Mater Hospital

Renin: See Aldosterone/Renin ratio

Retinol Binding Protein

Laboratory:	Referred from Clinical Biochemistry to Sheffield Northern General's PRU Diagnostic Service
Specimen:	1 ml Serum 2 ml Urine
Turnaround:	1 week from receipt in Referral laboratory
Ref. Range:	See report or contact Sheffield Northern General's PRU Diagnostic Service, ph: +44 (0) 114-271-5552 (Technical & Clinical Queries)

Respiratory Viral Screen (POCT)	
Laboratory:	Point of Care
Specimen:	Viral swab (combined nasopharyngeal and throat) A cobas® PCR Media Dual Swab nasopharyngeal viral swab (yellow top) is the recommended sample type, a deep nasal /mid turbinate swab may be appropriate alternative in certain patient groups.
Comment	POCT Respiratory Viral Screen includes RSV, Influenza A, Influenza B. A negative result may not exclude infection
Turnaround:	< 1 hour.
Report:	Detected, Not detected, Invalid

Respiratory Viral Screen (Molecular)	
Laboratory:	Microbiology
Specimen:	Viral swab (nasopharyngeal, nose, throat), nasopharyngeal aspirate, sputum, broncho-alveolar lavage **Do not send through the pneumatic tube.** **Note:** If there are two swabs in the viral swab collection kit, please use the thinner flocked swab only for combined throat and nasopharngeal sampling and discard the thicker cotton swab. Handwritten request for to accompany iCM request where Full respiratory Multiplex testing (except for Influenza) is required
Comment:	During Influenza season, a Respiratory viral screen typically includes SARS Co V 2, Influenza A and B, Respiratory Syncytial Virus (RSV), Human Metapneumovirus among others. Influenza A & B, SARS Co V2, RSV and Human metapneumovirus are INAB accredited tests. A rapid result is available when clinically indicated, but only when requested through prior consulation with the medical microbiology team. Only viral swabs will be accepted for this rapid test. A negative result may not exclude infection
Turnaround:	24 hours in season, may be up to 5 working days out of season
Report:	Detected, Not Detected, Inconclusive or Inhibited

Reticulocyte Count	
Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA) Paediatric (1mL purple (EDTA) or 1.3 mL red)
Comment:	The number of reticulocytes present in blood is an index of RBC production by the bone marrow. Specimen must be <12 hours of phlebotomy.
Turnaround:	Emergency specimens: < 2 hours Routine specimens: 8 – 24 hours
Ref. Range:	Refer to Full Blood Count reference range.

Rheumatoid Factor IgM	
Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Quantitative Nephelometric assay.
Turnaround:	24 Hours
Ref. Range:	0 - 14 IU/mL

Ribosomal P Protein	
Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround:	72 Hours

Ref. Range: Not applicable

Rickettsia Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Rare & Imported Pathogens Laboratory (RIPL), Porton Down)
Turnaround: 28 working days
Report: Qualitative result

Rivaroxaban

See DOAC's- Direct Oral Anti-coagulants.

Ro (SS-A)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround: 72 Hours
Ref. Range: Not applicable

Rotavirus / Adenovirus Assay

Laboratory: Microbiology (Category 3 Laboratory)
Specimen: Fresh faeces specimen. 1-2g is sufficient.
Comment: Immunochromatographic test using anti-Adenovirus monoclonal and anti-Rotavirus monoclonal reagents. Test performed Monday to Friday 9-5pm on children <5 years.
Turnaround: 24 hours.
Positive reports are telephoned when available to the requesting area.
Report: Positive or negative for Rotavirus and Adenovirus

Rubella IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: This test is used in the determination of immune status to rubella. Typically, this test is done as part of an antenatal or occupational health screen.
Turnaround: 36 hours
Report: Quantitative value (IU/mL)

Rubella IgM Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Patient history required. The presence of IgM antibodies suggests current/recent infection with the virus.
Turnaround: 36 hours
Report: Qualitative result

Salicylate

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 1 hour 30 mins
Ref. Range: In adults, symptoms of Salicylate toxicity may occur at levels >300mg/L

SARS CoV-2 (Molecular)

Laboratory: Microbiology
Specimen: Viral swab (combined nasopharyngeal and throat)
Do not send through the pneumatic tube.
Note: If there are two swabs in the viral swab collection kit, please use the thinner flocked swab only for combined throat and nasopharngeal sampling and discard the thicker cotton swab.

Comment:	Nasopharyngeal swabs or combined nasopharyngeal/throat swabs in universal transport media, viral transport media or cobas PCR media are suitable sample types for SARS-CoV-2 testing. **Do not send through the pneumatic tube.** **Note:** If there are two swabs in the viral swab collection kit, please use the thinner flocked swab only for combined throat and nasopharngeal sampling and discard the thicker cotton swab. A rapid SARS CoV-2 test is available when clinically indicated, but only when requested through prior consulation with the medical microbiology team. Only viral swabs will be accepted for this rapid test. SARS CoV 2 samples are processed 7 days a week with a weekend cut off for sample receipt of 12:30 A negative result may not exclude infection.
Turnaround:	24 hours, Urgent samples can be prioritised with prior approval with Microbiology medical team.
Report:	Detected, Not detected, Inconclusive or Inhibited

SARS CoV-2 / Influenza A/B (POCT)

Laboratory:	Point of Care
Specimen:	Viral swab (combined nasopharyngeal and throat) A cobas® PCR Media Dual Swab nasopharyngeal viral swab (yellow top) is the recommended sample type, a deep nasal /mid turbinate swab may be appropriate alternative in certain patient groups.
Comment:	Covid profile includes Sars CoV2, Influenza A, Influenza B A negative result may not exclude infection.
Turnaround:	< 1 hour.
Report:	Detected, Not detected, Invalid

Schistosoma haematobium

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	Collection of a terminal urine specimen is recommended (between 10am and 2pm as this is the period of maximum schistosomal activity). Sterile containers without boric acid must be used. In patients without haematuria, eggs may be found trapped in the blood and mucus in the terminal portion of the urine specimen. Transport specimens ASAP. Delays of over 48 hours are undesirable.
Comment:	Test performed Monday to Friday 9-5pm. If the urine cannot be examined within an hour of collection, it is advisable to add 1mL of undiluted formalin to preserve any eggs that may be present.
Turnaround:	24 hours
Report:	Schistosoma spp. Not seen **or** Schistosoma seen

Schistosoma Antibodies (Bilharzia)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround:	28 working days
Report:	Qualitative result

SCL-70

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround:	72 Hrs
Ref. Range:	Not Applicable.

Screening for Group B streptococcus (GBS) in pregnancy

Laboratory:	Microbiology
Specimen:	Low vaginal/rectal swab
Comment:	In keeping with HSE national clinical practice guidelines, screening will be performed in pregnant women on request at 35-37 weeks gestation where there is a history of GBS detected prior to current pregnancy.
Turnaround:	48-72 hours
Report:	Group B Streptococci Isolated/Not Isolated

Selenium

Laboratory:	SAS Trace Element Unit, Southhampton University Hospitals NHS Trust
Specimen:	2 ml Sod Hep Trace metal free plasma
Turnaround:	2 weeks from receipt in referral lab
Report:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Serotonin

Laboratory:	Referred from Clinical Biochemistry to Leeds General Infirmary
Specimen:	3 ml EDTA whole blood – FROZEN
Comment:	**Supply platelets count info** Serotonin is primarily raised in classical metastatic mid-gut carcinoid tumours. It is taken up readily by platelets or converted to 5-HIAA. Whole blood serotonin is measured and related to blood platelets.
Turnaround:	20 days from receipt in Referral laboratory.
Ref. Range:	See report or contact Leeds General Infirmary +44 (0) 113 392 3285/3286

SHBG

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	SHBG is analysed (females only) in conjunction with testosterone. Androgen index (AI) is then calculated.
Turnaround:	2 Weeks
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Sirolimus

Laboratory:	Sample referred from Clinical Biochemistry to Harefield Hospital
Specimen:	4.0 mL blood in an EDTA sample tube.
Turnaround:	2 weeks
Ref. Range:	Interpretation of Sirolimus is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement

Skin for Fibroblast Culture (Paediatric Neurology cases)

Laboratory:	Referred from Neuropathology to Sheffield Children's NHS Trust
Specimen:	3x3mm skin bx taken into sterile culture medium
Comment:	Please contact Neuropathology in advance. Culture medium available from Neuropathology Lab. To arrive in Sheffield Children's NHS Trust no later than 4:30pm Mon-Fri. Protocols available on request.
Turnaround:	4 months.

Skin Swab

See Wound Swab

Sm (Smith Antigen)

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround:	72 Hours
Ref. Range:	Not applicable

Small Round Structured Viruses (SRSV)

See Norovirus

Smooth Muscle Antibodies

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Qualitative Immunofluorescence assay initially part of Auto Antibody Screen. Positive sera are titred to end point. Sera showing specific Anti-Actin pattern on Immunofluorescence are commented upon.
Turnaround:	72 Hrs.
Ref. Range:	Not Applicable.

Sodium (Blood)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Sodium (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	24 Hr sample
Turnaround:	1 Day
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Spinal Muscular Atrophy (SMA)

Laboratory:	Referred from Biochemical Genetics to Clinical Genetics, CHI Crumlin
Specimen:	Infants: 1ml EDTA blood Adults 3-5ml EDTA blood
Comment:	Consent form available at https://www.childrenshealthireland.ie/list-of-services/clinical-genetics/
Turnaround:	Check CHI website
Report:	Sent to referring clinician and copy scanned to biochemical genetics

Sputum Culture

Laboratory:	Microbiology (Main laboratory)
Specimen:	Sputum from the lower respiratory tract expectorated by deep coughing. Check that specimen is of adequate quality as specimens of saliva and postnasal secretions are usually unsuitable. Ideally, the laboratory should receive a minimum volume of 1mL**.** The specimen should be collected into a clean, sterile, leakproof container. Sputum may be refrigerated for up to 2–3 hours without an appreciable loss of pathogens. Any delay beyond this time may allow overgrowth of Gram-negative bacilli, and *Haemophilus* species and *S. pneumonia* may die. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

Comment:	Please include any appropriate clinical details e.g. "Cystic fibrosis patient". If an unusual pathogen is suspected, the laboratory should be informed, *e.g. Burkholderia pseudomallei* and *Nocardia* sp require longer incubation of cultures. Refer to Mycobacteria testing for instructions for collection for TB culture. If a fungal infection is clinically suspected, please include as much information as possible regarding patient medical history, travel history and occupation,
Turnaround:	Prelim: 24 hours; Final: 4 days. Prolonged incubation is required for *Burkholderia* spp. And fungal culture, which are reported if positive.
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.

Stem cell enumeration CD34

Laboratory:	Haematology (Flow Cytometry depatement)
Specimen:	3 ml EDTA specimen peripheral blood
Comment:	Test performed only by prior arrangement with laboratory
Turnaround:	48 hours
Report:	CD34 Quantitation – stem cells detected per ml

STD Screen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Tests:	Hepatitis B surface antigen, HIV Ag/Ab, syphilis antibody
Turnaround:	Negative samples: 36 hours. Please allow extra time for samples testing positive in house for HIV Ag/Ab and syphilis antibody (confirmatory testing required).
Report:	Qualitative result

Sterile Body Fluid – Microscopy and Culture

Laboratory:	Microbiology (Main laboratory)
Specimen:	Specialist collection according to local protocols. Ideally, **a minimum volume** of 1mL should be collected into a clean, sterile, leakproof container. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. Results from delayed specimens must be interpreted with caution bearing in mind the difficulties in isolating anaerobes from these specimens Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Microscopy: 2 hours. Culture: Prelim: 24 hours; Final: 48-72 hours. Urgent report telephoned when available.
Report:	Total white cell count, differential leucocyte count (if appropriate), Gram Stain and Culture. All isolates are reported with appropriate sensitivities. Total white cell counts and differential leucocyte count are not performed on specimens containing a clot, which would invalidate the cell count.

Striated Muscle Antibodies

Laboratory:	Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround:	Approx. 3 Weeks
Ref. Range:	See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information

Strongyloides Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood

Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround:	28 working days
Report:	Qualitative result

Strongyloides Microscopy and Culture

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Faeces
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London). Faecal specimens should NOT be refrigerated.
Turnaround:	28 working days
Report:	Positive or negative

Sweat Test

Laboratory:	Clinical Biochemistry
Comment:	Sweat is collected in GD ward, GC Day unit and from the Adult CF unit
Turnaround:	Done daily.
Ref. Range:	Contact CUH Immunology Laboratory

Synacthen Test

Laboratory:	Clinical Biochemistry
Specimen:	Timed serum samples
Comment:	Clearly indicate on request form and sample the time of sampling
Turnaound:	3 days
Ref. range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate

Synovial Fluid

See Sterile Body Fluid – Microscopy and Culture

Syphilis Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Sera positive by chemiluminescent immunoassay are further tested by RPR (Rapid Plasma Reagin) and possibly TPHA (*Treponema pallidum* Haemagglutination Assay). Positive samples may be sent to a reference laboratory for confirmation.
Turnaround:	Negative: 36 hours Positive samples: 14 working days
Report:	Qualitative result

t(11:14) molecular testing in Mantle Cell Lymphoma

Laboratory:	Referred by Pathology Laboratory to Cancer Molecular Diagnostics (CMD), St. James hospital
Specimen:	FFPE tissue block
Turnaround:	6 weeks
Report:	Not applicable

Tacrolimus (FK506 / Prograf)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in an EDTA tube
Comment:	Trough sample required. Analysed twice weekly-Tuesday's and Thursday's.
Turnaround:	1-2 days
Ref. Range:	Interpretation of Tacrolimus is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement.

TB – See Mycobacteria testing

T-cell receptor gene rearrangements (Clonality studies)

Laboratory:	Referred from Pathology to CMD, St. James Hospital
Specimen:	FFPE tissue block
Comment:	
Turnaround:	6 weeks
Report:	Not applicable

Tear Duct – Culture

See Lacrimal

Temporal Artery Biopsies

Laboratory:	Neuropathology
Specimen:	Formalin-fixed artery
Turnaround:	3 days

Testosterone

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	1 Week
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Tetanus antibodies (IgG)

Laboratory:	Clinical Biochemistry
Specimen:	Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment:	Test performed by reference laboratory (Respiratory Infections Laboratory, Colindale, London).
Turnaround:	6-7 weeks
Report:	Greater than 0.43IU/mL indicates previous exposure to tetanus toxoid.

Theophylline

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent
Turnaround:	4 days. Urgents on request.
Ref. Range:	Therapeutic Range 10-20 mg/L Range quoted is appropriate for a trough sample.

Thiamine

Laboratory:	Referred from Clinical Biochemistry to Biomnis Ireland, Dublin.
Specimen:	2ml EDTA whole blood light protected
Comment:	Also referred to as Vitamin B1 or Aneurin
Turnaround:	1-2 weeks
Report:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Thioguanine Nucleotides (TGN)

Laboratory:	Referred from Clinical Biochemistry, CUH to Purine Research Lab, St Thomas/Viapath
Specimen:	4.0 mL blood EDTA sample (purple top)
Comment:	Store in fridge. Do not freeze Please provide a recent red blood cell result
Turnaround:	3 weeks.
Ref. Range:	Refer to final report.

Throat Swab

Laboratory:	Microbiology (Main laboratory)
Specimen:	Swab the tonsillar area and/or posterior pharynx avoiding the tongue and uvula. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature. If diphtheria or gonorrhoea is suspected special testing should be requested. Ideally, inoculation of specimens for *N. gonorrhoeae* is made directly on to culture media at the bedside and incubated without delay. Specimens for viral isolation should be submitted in appropriate viral transport medium (available from Microbiology, CUH).
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround:	Culture Final: 24-48 hours
Report:	Culture for ß-haemolytic streptococci, other bacteria (if appropriate), or yeasts.

Thrombophilia Screen

Laboratory:	Haematology
Specimen:	Three Blood 3mL, blue Vacuette® (sodium citrate 3.2%) and, One Blood 4mL red Vacuette (clotted specimen), One Blood 3mL purple Vacuette (EDTA specimen). Due to potential contamination of genetic material a separate EDTA sample is required. **Samples must be received within 4 hours of phlebotomy**. Thrombophilia request form FOR-CUH-PAT-1575, including documentation of patient consent, must be received with all requests and is available on the CUH website. www.bcshguidelines.com/documents/Heritable_thrombophilia_bjh_07_2010.pdf Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling. **Note: BCSH guidelines on Thrombophilia testing must be adhered to.**
Comment:	Test available Mon to Fri, during routine working hours. Thrombosis occurs when activation of blood coagulation overwhelms the ability of the natural anticoagulant mechanism and fibrinolytic system to prevent thrombus formation taking place. Thrombophilia screen consists of: INR, APTT, FIB, Actin FSL, DVV test, Antithrombin 3, Protein C, Activated Protein C Resistance and Protein S assays. Anti-Cardinolipin and Beta 2-Glycoprotein 1 are also included as part of the screen if a clotted sample is received. Requests must conform with BCSH guidelines **Samples without Request Form WILL NOT be processed.**
Turnaround:	3 – 4 weeks
Report:	Refer to final report for refenence intervals of individual assays

Thyroglobulin & Thyroglobulin Antibodies

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	4.0 mL blood in Li Hep or plain tube (clotted sample)
Comment;	On patients with diagnosed thyroid cancer only. Consultant request only.
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site https://www.*eurofins.ie/biomnis/* for up to date referral test information

Thyroid Antibodies (Anti-Thyroid Peroxidase Abs/ Anti-TPO Abs)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in a plain tube (clotted sample)
Turnaround:	4 days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Thyroid Stimulating Hormone (TSH)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 days
Ref. Range:	Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges. Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Thyroseq®

Laboratory:	Referred from Cytology Laboratory in Pathology Dept. to Thyroseq International, University of Pittsburgh Medical Centre.
Specimen:	Thyroid FNA Thin Prep Smear or Thyroid FNA FFPE Cell Block
Comment:	For the diagnosis of Thy 3a/Thy 3f in Thyroid Cancers.
Turnaround:	6 weeks

Tissue / Biopsy

Laboratory:	Microbiology (Main laboratory)
Specimen:	Tissue specimens for Microbiology must not be placed in formalin. The specimen should be collected into a clean, sterile, leakproof container. For small specimens, add several drops of sterile saline to keep moist (include on label the nature of any additives e.g. 10mL saline). Do not allow tissue to dry out. Bone marrow aspirates should be inoculated directly into a blood culture bottle as per the Blood Culture guidelines. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. It is vital that the specimen container is properly labelled.
Comment:	Test performed routinely Monday to Friday 9-5pm or by urgent request. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. The recovery of anaerobes is compromised if the transport time exceeds 3 hours. If a fungal infection is suspected, please include as much information as possible regarding patient medical history, travel history and occupation.
Turnaround:	Culture: Prelim: 24 hours; Final: 48-72 hours
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.

Tobramycin

Refer to Antibiotic Assays

TORCH

See Intra-Uterine Infection Screen

Toxicology / Drug Screen: Blood

Laboratory:	Sample referred from Clinical Biochemistry to Department of Clinical Biochemistry, Toxicology, Sandwell and West, posted Monday, Tuesday, Wednesday and Thursday.
Specimen:	4.0 mL blood in a plain tube (clotted sample; non gel tube)
Comment:	Tested for Benzodiazepines, Barbiturates, Alcohol, Tricyclics. Drug screen measurement is provided for clinical purposes only. Samples will not be accepted for medicolegal or workplace testing
Turnaround:	1 week
Ref. Range:	See report form or contact Department of Clinical Biochemistry, Toxicology, Sandwell and West

Toxicology / Drug Screen: Urine

Laboratory:	Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.

Specimen:	Spot urine
Comment:	Tested for Benzodiazepines, Barbiturates, Opiates, Cocaine, Propoxyphene, Cannabis, Amphetamine, Methadone, Phencyclidine, Alcohol. Drug screen measurement is provided for clinical purposes only. Samples will not be accepted for medicolegal or workplace testing
Turnaround:	1 week
Ref. Range	See report form or contact Beaumont Toxicology Dept. Tel (01) 8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

Toxocara Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround:	28 working days
Report:	Qualitative result

***Toxoplasma gondii* IgG Antibody**

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

***Toxoplasma gondii* IgM Antibody**

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	Negative samples: 36 hours Positive Toxoplasma IgM result must be confirmed by a reference laboratory – 28 working days
Report:	Qualitative result

TPMT Phenotyping

Laboratory:	Sample referred from Clinical Biochemistry to Dr Loretta Ford, Clinical Chemistry Dept., City Hospital, Dudley Road, Birmingham, West Midlands, B18 7QH Tel 004421 5074271
Specimen:	5 – 10 mL EDTA whole blood
Turnaround:	4 weeks
Ref. Range	Contact laboratory

Transferrin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 Days
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

% Transferrin Saturation

Laboratory:	Clinical Biochemistry
Specimen:	Not applicable
Comment:	Calculated from the Iron and Transferrin results.
Turnaround:	4 Days
Ref. Range:	Contact biochemistry

Trichinella Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 28 working days
Report: Qualitative result

Trichomonas vaginalis

Laboratory: Microbiology (Main laboratory)
Specimen: Testing for *Trichomonas* vaginalis will not be performed unless a labelled slide is sent accompanying the swab.
For *Trichomonas*, the posterior fornix should be swabbed. The slide should then be placed in a slide holder.
Comment: This examination must be specifically requested.
Turnaround: 24 hours.
Report: Trichomonas vaginalis seen or not seen

Tricyclics

Laboratory: Sample referred from Clinical Biochemistry to Department of Clinical Biochemistry, Toxicology, Sandwell and West Birmingham, posted Monday, Tuesday, Wednesday and Thursday.
Specimen: Blood: 4.0 mL blood in a plain tube (clotted sample)
Comment: See Toxicology / Drug Screen
Turnaround: 1 week
Ref. Range: See report form or contact Department of Clinical Biochemistry, Toxicology, Sandwell and West Birmingham

Triglycerides

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Fasting sample required
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Troponin I – High Sensitive

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 1 hour 15 mins
Ref. Range: The 99th. Centile is = <19.8ng/L (male)
is = <11.6ng/L (female)
Optimally for the biochemical diagnosis of MI it is recommended that two samples are taken for Troponin I (hs) measurement; the first at presentation and the second 3 to 6 hours later.
In a patient with evidence of ischaemia: AMI is likely if, at least one result is > 34 ng /L (for males) or >16ng/L (for females) **and** Troponin I (hs) values change by 50% or more between the two samples.

Trypanosoma cruzi Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (National Parasitology Reference Laboratory (NPRL), London)
Turnaround: 28 working days
Report: Qualitative result

Tryptase (Mast Cell)

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 4.0 mL blood in Li Hep or plain tube (clotted sample)

Comment: Draw blood as soon as possible after anaphylactic shock, again at 2 hours and 8 hours after.
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information

Ttg (tissue Trans Glutaminase antibodies)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Quantitative Immunoassay using Phadia Immunocap 250 analyser. Part of Coeliac screen. Anti EMA undertaken automatically on all positive sera to confirm.
Turnaround: 24 Hours
Ref. Range: 0 - 2.5 AU/ML

Tuberculosis Testing

Refer to Mycobacteriology

Tubule Antibodies

Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround: Approx. 3 Weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information

U1RNP

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround: 72 Hours
Ref. Range: Not applicable

Ulcer Swab

See Wound Swab

Urate (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Urate (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 Hour collection
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Urea (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 30 mins. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours. Urgent GP requests and OPD 1 day. Routine GP 4 days.
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Urea (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 Hr urine sample
Turnaround: 1 Day
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Urethral Swab

Refer to Genital swab

Urinary *Legionella* Antigen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: Urine
Comment: Test performed only by special arrangement with Microbiology Consultant
Turnaround: 36 hours
Report: Positive or negative

Urinary Steroid Profile

Laboratory: Referred from Biochemistry to Kings College Steroid Lab, London
Specimen: 24hur urine
Turnaround: 5 weeks
Ref. Range: See report form

Urinary Schistosomiasis

See Schistosoma haematobium

Urinary *Streptococcus pneumoniae* Antigen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: Urine
Turnaround: 36 hours
Report: Positive or negative

Urine Microscopy and Culture

Laboratory: Microbiology (Main laboratory)
Specimen: Ideally, a minimum of 8.5mL is required for routine culture. The specimen should be collected into a clean, sterile, leakproof 10ml BD Vacutainer® C&S Urine Tube for Culture and Sensitivity with boric acid.

Note: A minimum of 8.5mL is *essential* for boric acid samples. Sample volumes between 2mL and 8.5mL will be processed, however the following specimen comment will be attached: Volume <8ml, interpret result with caution. Where smaller volumes of <2mL are collected, do not use a boric acid container but use a clean sterile leak-proof 20ml universal. Specimens of <2mL received in the BD Vacutainer® boric acid container will be not be processed.

Excessive fluid intake will dilute the urine and may decrease the colony count to $<10^5$ CFU/mL.

Separate specimens must be collected for detection of Mycobacteria or *S. haematobium*. A fresh specimen is essential for the investigation of casts.

Specimen Types

Midstream urine (**MSU**) Recommended for routine use. The first part of voided urine is discarded and without interrupting the flow, approximately 10mL is collected into a 10ml BD Vacutainer® C&S Urine Tube for Culture and Sensitivity with boric acid. The remaining urine is discarded.

Bag specimen urine (**BSU**). Used commonly for infants and young children. The sterile bags are taped over the genitalia and the collected urine is transferred to a sterile 10ml BD Vacutainer® C&S Urine Tube for Culture and Sensitivity with boric acid. There are frequent problems of contamination with this method of collection.

Clean catch urine (**CCU**). Thorough periurethral cleaning is recommended. The whole specimen is collected into a 10ml BD Vacutainer® C&S Urine Tube for Culture and Sensitivity with boric acid.
Suprapubic aspirate (**SPA**). The use of this invasive procedure is usually reserved for clarification of equivocal results from voided urine e.g. in infants.
Catheter urine (**CSU**). May be obtained from suprapubic or per urethral catheters. The specimen should not be obtained from the collection bag.
Ileal conduit-urostomy urine is collected via a catheter passed aseptically into the stomal opening after removal of the external appliance. Results from this type may be difficult to interpret and should be performed only if there is an indication for treatment, such as pyrexia or constitutional upset.
Cystoscopy urine is obtained directly from the bladder using a cystoscope.

Comment:	It is important that there should be minimal delay before culture. If processing is delayed >6 hours, refrigeration for up to 48 hours and use of boric acid containers is recommended. Ensure containers are filled to the line (8.5mL).	
Turnaround:	Microscopy:	Routine: 24 hours. Urgent: 2 hours of receipt.
	Culture:	Preliminary: 24 hours. Final: 24-72 hours
Report:	Microscopy:	Report on the range of WBCs and RBCs per cmm as well as the presence of epithelial cells, casts, bacteria, yeasts and *Trichomonas* spp. (if present).
	Culture:	Report bacterial growth in orgs/mL with sensitivities and comment where appropriate. Culture will only be carried out where WCC is >25/µL AND organisms are seen , but the following are cultured in all cases; Antenatal, <16 year, Renal, ICU, potentially immunocompromised.

Vaginal Swab (HVS/LVS)

Laboratory:	Microbiology (Main laboratory)
Specimen:	High Vaginal swabs (HVS) are the preferred sample type in most clinical scenarios. Low Vaginal swabs (LVS) are suitable for the investigation of vulval vaginitis in paediatric patients. LVS/Anorectal swabs are the preferred sample type for Group B streptococci screening (refer to separate section **Screening for Group B streptococcus (GBS) in pregnancy**). Only swabs sent in suitable transport medium will be processed – swabs that are sent without transport medium may be dry and may not yield the targeted organisms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment:	Please indicate specific site of sample e.g. low vaginal, high vaginal, vulval. Clinical details need to be provided on request form so appropriate investigations (microscopy, culture and susceptibilities) can be performed. For screening for Group B streptococcus in pregnancy please see relevant section. Vaginal swabs are not recommended for gonococcal culture on adults; an endocervical specimen is more appropriate. A separate specimen of urine or specific swabs and transport medium should be collected for the detection of *C. trachomatis*. Microscopy for bacterial vaginosis (BV) is performed on symptomatic women aged 12-55 (including those who are pregnant), and in relevant clinical conditions e.g. PROM, SROM. Culture: Clinically significant isolates will be identified and susceptibility testing preformed as appropriate. Specimens will be processed for *Trichomonas vaginalis* if requested.

Turnaround:	Final: 48-72 hours
Report:	Microscopy: WBCs, yeasts, trichomonads and clue cells if present. Excess pus cells suggest infection; motile trichomonads indicate trichomoniasis, yeasts and hyphae suggest Candidiasis; clue cells in the absence of normal flora is suggestive of anaerobic vaginosis. Culture: Any clinically significant isolate with the appropriate sensitivities.

Valproate

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Comment:	Chronic oral dosing: trough sample immediately before next dose
Turnaround:	1 Day, TAT for GP requests is 4 days

Vancomycin

Refer to Antibiotic Assays

Vancomycin Resistant Enterococci (VRE)

Laboratory:	Microbiology (Main laboratory)
Specimen:	Rectal swabs, placed in charcoal containing transport media.
Comment:	Test performed Monday to Friday 9-5pm. Label all Microbiology forms with VRE SCREEN. Indicate if the patient was previously VRE positive. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.
Turnaround:	Prelim: 48 hours; Final: 48-72 hours
Report:	"VRE not isolated", *Enterococcus faecium/faecalis* (New VRE)/(VRE) isolated.

Varicella-zoster Virus IgG Antibody

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Qualitative result

Varicella-zoster Virus Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	CSF (1mL), viral swab (skin, eye), vesicle fluid, skin scrapings
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Vasculitic Screen

Laboratory:	Autoimmune Serology
Specimen:	Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment:	Includes Auto Antibody Screen + Anti Neutrophil Cytoplasmic Antibody assay.
Turnaround:	48 Hours or stat by contacting laboratory.
Ref. Range:	Not applicable. Refer to follow on tests if Screen Positive.

Very Long Chain Fatty acids

Laboratory:	Sample referred from Clinical Biochemistry to Willink Institute, Manchester.
Specimen:	4.0 mL blood in EDTA or Lithium Heparin
Turnaround:	3 weeks
Ref. Range:	See report form

Vincent's Angina

See Mouth Swab

Viral Screen (Eye)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Viral swab
Tests:	Adenovirus, herpes simplex virus 1/2, varicella-zoster Virus (VZV)
Comment:	Performed by a reference lab (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 working days
Report:	Detected or not detected

Viscosity

Laboratory:	Viscosity testing is referred from Clinical Biochemistry (Immunology section) to St. James' Hospital, Dublin
Specimen:	2 samples in EDTA bottles.
Comment:	Viscosity >2.9 associated with Hyperviscosity Syndrome
Turnaround:	3 Days
Ref. Range:	Refer to Haematology Dept. St. James Hospital.

Vitamin A (Retinol)

Laboratory:	Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London.
Specimen:	4.0 mL blood in lithium heparin or serum sample (**light protected**)
Comment:	Consultant request only. Protect from light.
Turnaround:	5 weeks
Ref. Range:	See report form, or visit internet site www.nutristasis.com for up to date referral test information

Vitamin B12

Laboratory:	Haematology
Specimen:	Blood 4mL red Vacuette (clotted specimen).
Comment:	Test available Monday to Friday, during routine working hours. Vitamin B12 is a coenzyme necessary to the biosynthesis of DNA and RNA. Deficiency in man is associated with megaloblastic anaemia it is also vital to the normal metabolism of folic acid. It is of particular importance to recognise vitamin B12 deficiency as it causes both neurologic and psychiatric damage, which is preventable when diagnosed at an early stage. Values between 120 and 135 ng/l are considered indeterminate and should be interpreted in conjunction with full blood count results (including macrocytosis and clinical parameters). B12 and Folate should be requested for investigation of abnormal FBC results and relevant clinical syndromes. Use of haematinics for screening of well patients is not recommended. Requests should be accompanied by clinical details. See BCSH guidelines. The diagnosis of B12 and folate deficiency http://onlinelibrary.wiley.com/doi/10.1111/bjh.12959/pdf
Turnaround:	7 working days
Ref. Range:	140 – 844ng/L 120 – 170 ng/L indeterminate These are ADULT ranges – for guidance only

1, 25 Dihydroxy Vitamin D (Calcitrol)

Laboratory:	Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen:	Ml blood in a plain tube (clotted sample) on ice, must be frozen < 1 hr. (minimum 2.0 mL serum required)
Comment:	Consultant request only.
Turnaround:	3 weeks

Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

Vitamin D (25Hydroxy Vitamin D) / Hydroxycholecalciferol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample).
Comment: Appropriate clinical details essential
Turnaround: 10 days
Ref. Range: Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

Vitamin E (Tocopherol)

Laboratory: Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London
Specimen: 4.0 mL blood in a plain tube (clotted sample).
Comment: Sample must be separated < 1 hour.
Turnaround: 5 weeks
Ref. Range: See report form, or visit internet site www.nutristasis.com for up to date referral test information

Vitamin K (Phytonadione)

Laboratory: Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London
Specimen: 4.0 mL blood in a plain tube (clotted sample) on ice, must be separated and frozen within 1 hour
Comment: Protect from light. Consultant request only.
Turnaround: 5 weeks
Ref. Range: See report form, or visit internet site www.nutristasis.com for up to date referral test information

Von-Willebrand Multimers / Collagen binding

Laboratory: Referred from Haematology Dept. National Coagulation Laboratory, Centre for Clinical Pathology and Laboratory Medicine (CPLM), St James Hospital, Dublin 8
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x 3
Comment: This is part of the Von Willebrand Screen which includes VW:Ag, VW:Rco, and Factor VIII. Multimers are only analysed in specific circumstances or on request by Coagulation Consultant.
Turnaround: 90 days / 140 days (Working days)
Report: Sent to referring clinician and copy filed in laboratory

Von Willebrand Screen: Ristocetin Co-factor vWF Activity, Von-Willebrand Factor Antigen and Factor VIII

Laboratory: Haematology
Specimen: Blood 3mL x 3, blue Vacuette® (sodium citrate 3.2%)
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).
Comment: Test available Monday to Friday, during routine working hours. Screen includes Factor V111 assay, vWF:ag (vW factor Ag), vWFactor Activity (Ristocetin Co-Factor)
Samples must be received within 4 hours of phlebotomy
Turnaround: 3 – 4 weeks
Ref. Range: vWF activity: 0.55 – 1.56 IU/mL
vWF Ag level: 0.50 – 1.60 IU/mL
Factor VIII Adult 0.50 – 1.49 IU/mL

VWF Cleaving Protease (vWFcp) Assay (ADAMTS13 Activity and Antibodies)

Laboratory	Refered from Haematology to HSL/TDL (Health Services Laboratories) Haemostasis Laboratory, Haematology Department, 60 Whitfield Street, London, W1T 4EU or Belfast Belfast Trust Health and Social Care Northern Ireland, Haemostasis Laboratory if Urgent
Specimen:	Blood 3mL blue Vacuette® (sodium citrate 3.2%) fill tube to mark.
Comment:	Request must be booked in advance with the Haematology Laboratory CUH. Requested by Consultant Haematologist for further investigation of von Willebrand Disease. ADAMTS13 Assay Request form must be completed, must be sent on dry ice and samples can only be referred Monday or Tuesday (via Eurofins-Biomnis).
Turnaround:	60 days
Report:	Sent to referring clinician and copy filed in laboratory

Warfarin Plasma Resistance Concentration and gene

Laboratory:	Sample is referred from Haematology to The Centre for Haemostasis and Thrombosis, 1st Floor North Wing, St Thomas' Hospital
Specimen:	2 x EDTA and 2 x Citrate, needs to be booked with the laboratory prior to sampling.
Comment:	Requested by Coagulation Consultant Super Warfarin (rodenticides) Vitamin K1 and PIVKA 11 are part of this profile reported and may be requested
Turnaround:	21 days /80 days (Working days)
Report:	Sent to referring clinician and copy filed in laboratory

West Nile Virus Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	By arrangement
Report:	Qualitative result

Whipples Disease (*Tropheryma whipplei*)

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL EDTA blood, CSF
Comment:	PCR test performed by a reference laboratory (Microbiology, Great Ormond Street Hospital for Children, London)
Turnaround:	28 working days
Report:	Detected or not detected

Whipples Disease (*Tropheryma whipplei*)

Laboratory:	Microbiology Main Lab
Specimen:	CSF
Comment:	PCR test performed by a reference laboratory (Micropathology)
Turnaround:	5 working days
Report:	Detected or not detected

Whooping Cough

See *Bordetella* Species – Culture

Winter Vomiting Bug

See *Norovirus – Norwalk-like viruses (NLV) /Small Round Structured Viruses (SRSV)*

Wound Swab (Skin /Abscess / Decubitus ulcer / Bite / Burn swab)

Laboratory:	Microbiology (Main laboratory)

Specimen:	Always list site and type of wound on request form. Specimens of pus, if present, are preferred to swabs. Pus /fluids up to a volume of 20mL should be supplied (ideally a minimum of 1mL). Swabs should be soaked in exudate where possible. Specimen a representative part of the lesion. Specimen the deepest part of the wound, avoiding the superficial microflora.	
Comment:	The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. Specimens should be transported to the laboratory within 3 hours after which the recovery of anaerobes is compromised. Results from delayed specimens must be interpreted with caution bearing in mind the difficulties in isolating anaerobes from these specimens. Routine processing of superficial swabs of ulcers should be discouraged. Swabbing dry crusted areas is unlikely to be helpful. If specimens are taken from ulcers the debris on the ulcer should be removed, the ulcer cleaned with saline and either a biopsy, or preferably a needle aspiration of the edge of the wound taken. A less invasive irrigation-aspiration method may be preferred. Using a small needle-less syringe, place the syringe tip under the ulcer margin and irrigate gently with at least 1mL sterile saline without preservative. After massage of the ulcer margin, repeat the irrigation with a further 1mL sterile saline. Massage the ulcer margin again, aspirate approximately 0.25mL of the fluid and place in a sterile, leakproof container.	
Turnaround:	Urgent microscopy (pus /fluid):	Within 2 hours of receipt.
	Culture:	Preliminary report: 24 hours; Final report: 24-72 hours
Report:	Microscopy:	Report on the numbers of WBCs/cmm and the presence of organisms if present.
	Culture:	"No growth" or "skin flora" or report any clinically significant organism isolated with sensitivities.

Zika Virus

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood (Serology), 4mL EDTA blood (Molecular)
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	14 days
Report:	Qualitative result (Serology), Detected or Not Detected (Molecular)

Zinc

Laboratory:	Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford
Specimen:	4.0 mL blood in a metal-free plain tube (clotted sample).
Turnaround:	3 weeks
Ref. Range:	Up-to-date reference intervals will be applied to all Biochemistry reports as appropriate.

14 GLOSSARY OF ABBREVIATIONS

The abbreviations used in this handbook include names of tests are in accordance with current use and accepted recommendations.

ACE	Angiotensin converting enzyme
ACTH	Adrenocorticotrophic hormone
ADH	Antidiuretic hormone
AFB	Acid fast bacilli
AFP	Alpha-Fetoprotein
ALT	Alanine aminotransferase
ALP	Alkaline phosphatase
ANCA	Antineutrophil 204riiodothyr antibody
ANF	Antinuclear Factor
APC	Activated protein C
APTT	Activated partial Thromboplastin time
ASOT	Antistreptolysin O titre
AST	Aspartate aminotransferase
BJP	Bence Jones Protein
C3	Third component of complement
C4	Fourth component of complement
CA	Carbohydrate antigen (tumour markers)
CEA	Carcinoembryonic antigen
CK	Creatine kinase
CMV	Cytomegalovirus
CPE	Carbapenemase Producing Enterbacteriales
CRP	C-reactive protein
CSF	Cerebrospinal fluid
DDI	D-Dimers
DHEA	Dehydroepiandrosterone
DHEAS	Dehydroepiandrosterone sulphate
DVVT	Dilute Viper Venom test
EBV	Epstein Barr virus
EDTA	Ethylene diamine tetra-acetic acid
EGFR	Epidermal Growth Factor Receptor
EMA	Endomycial Antibodies
ENA	Extractable Nuclear Antigens
EPO	Erythropoietin
ESR	Erythrocyte sedimentation rate
FISH	Flourescence In Situ Hybridisation
FBC	Full blood count, full blood examination, complete blood count
FNAB	Fine needle aspiration biopsy
FSH	Follicle stimulating hormone
FT3	Free Triiodothyronine (T3)
FT4	Free thyroxine (T4)
GBM(Q)	Glomerular Basement Membrane Antibodies (Quick test)
GC	Gonococci
GGT	Gamma glutamyl transferase (transpeptidase)
GTT	Glucose tolerance test
HAV	Hepatitis A virus
Hb	Haemoglobin
HbA1c	Glycated haemoglobin

HbA2	Haemoglobin A2
HbF	Haemoglobin F, fetal haemoglobin
HbS	Sickle haemoglobin, haemoglobin S
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
hCG	Human chorionic gonadotrophin
HCO_3	Bicarbonate
HCT	Haematocrit, packed cell volume
HCV	Hepatitis C virus
HDL	High density lipoprotein
HDNB	Haemolytic Disease of the Newborn
hGH	Human growth hormone
HIAA	5-Hydroxyindole acetate
HLA	Human leucocyte antigen
HMMA	4-hydroxy-3-methoxymandelate
HPV	Human papillomavirus
HSV	Herpes simplex virus
HVA	Homovanillate
HVS	High Vaginal Swab
HZV	Herpes zoster virus (varicella-zoster)
ICCS	Intercellular cement substance
Ig	Immunoglobulin
IGF	Insulin-like growth factor
INR	International normalised ratio
IUCD	Intrauterine Contraceptive Device
kg	Kilogram
kPa	Kilopascal
KRAS	KRAS gene
LD	Lactate dehydrogenase
LDL	Low density lipoprotein
LGV	Lymphogranuloma venereum
LH	Luteinising hormone
MCH	Mean cell haemoglobin
MCHC	Mean cell haemoglobin concentration
MCV	Mean cell volume
MGUS	Monoclonal gammopathy of unknown significance
MMR	Measles, mumps, rubella IgG antibodies
MRSA	Methicillan-Resistant *Staph aureus*
MSI	Microsatellite Instability
MSU	Midstream Urine
MTHFR	Methyltetrahydrofolate Reductase
PCR	Polymerase chain reaction
pCO_2	Partial pressure of carbon dioxide (CO_2)
PCP	Pneumocystis jirovecii
PCV	Packed cell volume
PDL1	Programmed Death Ligand-1
PIE	Pulmonary infiltration with eosinophilia
PNH	Paroxysmal nocturnal haemoglobinuria
pO_2	Partial pressure of oxygen (O_2)
PR	Prothrombin ratio
PSA	Prostate specific antigen

PT	Prothrombin time
PTH	Parathyroid hormone
PTHrP	Parathyroid hormone related peptide
RAST	Radioallergosorbent test- see specific IgE
RCC	Red cell count
RDW	Red cell distribution width
RFLP	Restriction fragment length polymorphism
RPR	Rapid Plasma Reagin
RSV	Respiratory syncytial virus
SHBG	Sex hormone binding globulin
SLE	Systemic lupus erythematosus
SM	Smith Antigen
STI	Sexually transmitted infection
T3	Triiodothyronine
T4	Thyroxine (tetraiodothyronine)
TBG	Thyroxine binding globulin
TORCH	Toxoplasma, rubella, cytomegalovirus, parvovirus B19
TPHA	*Treponema pallidum* Haemagglutination Assay
TRH	Thyrotropin releasing hormone
TSH	Thyroid stimulating hormone
tTG	Tissue Trans Glutaminase Antibodies
VCA	Viral capsid antigen (EBV)
VIP	Vasoactive intestinal polypeptide
VRE	Vancomycin- Resistant Enterococci
vWf	von Willebrand factor
vWfAg	von Willebrand factor antigen
WCC	white cell count, leucocyte count
XDP	Cross linked fibrin degradation products, D-dimer

15 NAMES AND ADDRESSES OF REFERRAL LABORATORIES

Name	Address	Referring Dept
Alpha One Foundation	RCSI Building, Beaumont Hospital, Dublin 9	Biochemistry
Anaerobe Reference Laboratory	NPHS Microbiology Cardiff University Hospital of Wales Heath Park Cardiff CF14 4XW	Clinical Microbiology
Analytical Services International Ltd	St. George's University Of London Cranmer Terrace, London SW17 ORE	Biochemistry
Antimicrobial Reference Laboratory	Department of Medical Microbiology Southmead Hospital Westbury on Trym Bristol BS10 5NB	Clinical Microbiology
Belfast City Hospital (CLL)	Molecular Haematology, Haematology Department, Belfast City Hospital, Belfast Health and Social Care Trust, 51 Lisburn Road, Belfast, UK BT9 7AB.	Haematology
Beaumont Hospital	Biochemistry Lab, Beaumont, Dublin 9	Biochemistry
Biochemical Genetics Unit	Box 247Addenbrooke's Hospital Hills RoadCambridgeCB2 2QQ	Biochemistry
Biochemistry Department, St. James's Hospital	James's Street, Dublin 8, Ireland	Biochemistry
Biochemistry, Mater Misericordiae University Hospital (MMUH)	Eccles St., Dublin 7	Biochemistry
Bristol Genetics Laboratory	North Bristol NHS Trust, Bristol Genetics Lab, Pathology Sciences, Southmead Hospital, Westbury-On-Trym, Bristol, BS10 5NB	Haematology
Brucella Reference Unit (BRU)	Liverpool Clinical Laboratories, Royal Liverpool and Broadgreen University Hospitals NHS Trust, Duncan Building, Prescot St., Liverpool L7 8XP, England	Clinical Microbiology
Cancer Molecular Diagnostics (CMD), St James Hospital	Cancer Molecular Diagnostics, SJH, LabMed Directorate, St. James's Hospital, Dublin 8, D08 W9RT	Haematology Pathology
Cardiff and Vale University Health Board, Dept of Medical Biochemistry	University Hospital of Wales Cardiff CF 14 4XY	Biochemistry
CeGaT Genetic Diagnostics	CeGaT GmbH Paul-Ehrlich-Straße 23 D-72076 Tuebingen, Germany	Biochemistry
Central Pathology Haematology, St James's Hospital	Haematology Laboratory, Central Pathology Laboratory (CPL) Building, LabMed Directorate, St. James's Hospital, Dublin 8, D08 W9RT	Haematology
Cellular Pathology Services	Unit 12, Orbital 25 Business Park, Dwight Road, Tolpits Lane, Watford, WD189DA, UK.	Pathology
Charing Cross	Dr. Candice Roufosse, 3rd Floor Charing Cross Hospital, Fulham Palace Road, London W6 8RF, UK.	Pathology

Name	Address	Referring Dept
Cholinesterase Investigation Unit	Pathology Sciences Building Southmead Hospital Westbury-on-Trym Bristol BS10 5NBUnited Kingdom	Biochemistry
City Hospital Birmingham	Dr Jonathan Berg / Dr Loretta Ford City Hospital, Dudley Road, Birmingham, B18 7QH, UK	Biochemistry
Clinical and Molecular Genetics Unit	Institute of Child Health.30 Guildford Street, London United Kingdom	Biochemistry
Clinical Biochemistry Department Viapath/Synnovis	Kings College Hospital Denmark Hill, LondonSE5 9RS, United Kingdom020 3299 9000	Biochemistry
Consultant Renal Pathologist, Beamount	EM/Histopathology Department, Beaumont Hospital, Beaumont Road, Dublin 9, D09 A0KH	Pathology (Electron Microscopy)
Department of Clinical Chemistry and Newborn Screening, Sheffield	Sheffield Children's NHS Trust Western Bank Sheffield S10 2TH, United Kingdom	Biochemistry, Neuropathology
Department of Clinical Genetics, CHI Crumlin	Department of Clinical Genetics, Children's Helath Ireland at Crumlin, Dublin 12, Ireland	Biochemistry, Haematology
Department of Immunology,North General Hospital	Herries Road, Sheffield S5 7AU	Immunolgy
Department of Microbiology	Old Medical School, Leeds General Infirmary, Thoresby Place, Leeds LS1 3EX, England	Clinical Microbiology
Eurofins-Biomnis Ireland	Three Rock Road, Sandyford Business Estate, Dublin 18, Ireland	Biochemistry, Haematology, Microbiology
Eurofins-Biomnis SELA S	17/19 Avenue Tony Garnier, 69007, Lyon, France	Neuropathology
Freeman Hospital	Freeman Hospital Freeman Road High Heaton Newcastle Upon Tyne NE7 7DNUnited Kingdom	Biochemistry
Gastrointestinal Bacteria Reference Unit (GBRU)	Bacteriology Reference Department, UK Health Security Agency, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
Genomic Health, Inc.	Genomic Health, Inc.,301 Penobscot Drive, Redwood City, CA 94063,USA	Pathology
Great Ormond Street Immunology	Great Ormond Street Immunology, Departments of Immunology and Clinical Molecular Genetics, Level 4 Camelia Botnar Laboratories, Great Ormond Street Hospital Great Ormond Street, NHS Trust, WC1N 3JH	Haematology
GSTS Pathology Kingspath Hospital, King's College Hospital NHS Foundation Trust	Mr Christopher Lambert, Red Cell Laboratory, c/o Main Pathology CSR, Viapath Analytics, Ground Floor Bessemer Wing, King's College Hospital, Denmark Hill, London SE5 9RS, United Kingdom	Haematology
Haematology, Our Lady's Hospital Crumlin	Our Lady's Children's Hospital, Division of Cytogenrtics (Oncology), Crumlin, Dublin 12, Ireland	Haematology
Haemostasis Molecular Diagnostics (HMD), St James Hospital	Haematology Dept. to Haemostasis Molecular Diagnostics (HMD), National Coagulation Laboratory, Centre for Clinical and Laboratory Medicine, CPLM, St James Hospital, Dublin 8	Haematology

Name	Address	Referring Dept
Harefield Hospital	Mr Neil Leaver Principal Clinical Scientist, Harefield Hospital,Harefield 90 UB United Kingdom	Biochemistry
Histopathology Department, SVUH	Histopathology Department, St. Vincent's University Hospital, Dublin	Pathology
HPA/PHE Laboratory	P.O. Box 209Manchester Medical Microbiology Partnership Clinical Sciences Building Manchester Royal Infirmary Oxford Road	Biochemistry
HSL (Health Services Laboratories)	HSL (Health Services Laboratories) Haemostasis Laboratory, Haematology Department, 60 Whitfield Street, London, W1T 4EU	Haematology
Immunology Department and Protein Reference Unit	P.O Box 894 Sheffield S5 7YTUnited Kingdom	Biochemistry
Irish Meningitis & Sepsis Reference Laboratory (IMSRL)	The Children's University Hospital, Temple St, Dublin 1, Ireland	Clinical Microbiology
Irish Mycobacterial Reference Laboratory	Clinical Microbiology, St. James's Hospital, James's Street, Dublin 8	Clinical Microbiology
John Radcliffe Hospital (Oxford University Hostpitals)	Dr Lisa Browning, Cellular Pathology, The John Radcliffe Hospital, Headley Way, Headington, Oxford, UK OX3 9DU Oxford Univeristy Hostpital, Oxford.	Pathology
Leeds Cancer Centre	HMDS, Leeds Cancer Centre, Bexley Wing, Beckett Street, Leeds LS9 7TF	Haematology
Leeds Endocrinology Laboratory	Department of Specialist Laboratory Medicine Block 46 St James Hospital Leeds Gen LS9 7TF	Biochemistry
LMH, King's Haematological Malignancies Diagnostic Centre (KHMDC),	Molecular Haemato-Oncology (LMH), Department of Haematological Medicine, King's College Hospital, The Rayne Institute, 123 Coldharbour Lane, London SE5 9NU (BCR-ABL1 Kinase Domain Mutations using renal Sequencing)	Haematology
Malaria Reference Laboratory	PHE Malaria Reference Laboratory, Faculty of Infectious & Tropical Diseases, London School of Hygiene & Tropical Medicine, Keppel Street, LONDON, WC1E 7HT	Haematology
Manchester Centre for Genomic Medicine	Genomic Diagnostics Laboratory, 6th floor, St Mary's hospital, Oxford Road, Manchester M13 9WL, UK.	Pathology
Med Lab Pathology	Unit 3, Sandyford Business Centre, Sandyford Business Park, Dublin 18	Biochemistry
Metabolic Investigation Laboratory, Children's Health Ireland	Temple St., Dublin 1	Biochemistry
Microbiology	Great Ormond Street Hospital for Children, Great Ormond Street, London WC1N 3JH, England	Clinical Microbiology
Micropathology Ltd	University of Warwick Science Park, Venture Centre, Sir William Lyons Road, Coventry CV4 7EZ	Clinical Microbiology
Microbiology, Central Pathology Laboratory	St James's Hospital, James's St., Dublin 8	Clinical Microbiology

Name	Address	Referring Dept
Mitochondrial NCG Diagnostic Service	The Medical School, Newcastle University, Framlington Place, Newcastle upon Tyne NE2 4HH, UK	Pathology
Molecular Histopathology Laboratory, Beaumont Hospital	Molecular Histopathology Laboratory, Department of Pathology, R.C.S.I. Education & Research Centre, Beaumont Hospital, Dublin 9	Pathology
Molecular Microbiology, Central Pathology Laboratory	St James's Hospital, James's St., Dublin 8	Clinical Microbiology
MRSA National Reference Laboratory	St. James's Hospital, James's Street, Dublin 8.	Clinical Microbiology
Munich Leukaemia Laboratory (MLL)	MLL Münchner Leukämielabor GmbH, Max-Lebsche-Platz 31, 81377 München, Postfach 20 14 53, 80014 Munich, Germany	Haematology
Mycology Reference Centre	Old Medical School, Thoresby Place, Leeds LS1 3EX, England	Clinical Microbiology
National Amyloidosis Centre	Royal Free Hospital Rowland Hill Street London, NW3 2PF	Biochemistry, Pathology
National Coagulation Laboratory	National Coagulation Laboratory, Centre for Clinical Pathology and Laboratory Medicine, (CPLM), St James Hospital, Dublin 8	Haematology
National Carbapenemase Producing Enterobacteriales Reference Laboratory	Carbapenemase Producing Enterobacteriales (CPE) Reference Laboratory,Department of Medical Microbiology, University Hospital Galway, Galway	Clinical Microbiology
National Mycobacterium Reference Laboratory	Abernethy Building Institute of Cell and Molecular Science (ICMS)2 Newark Street London E1 2AT	Clinical Microbiology
National Parasitology Reference Laboratory (NPRL)	Department of Clinical Parasitology, Hospital for Tropical Diseases, Mortimer Market, Capper Street, London WC1E 6JB, England	Clinical Microbiology
National Salmonella, Shigella & Listeria Reference Laboratory	Department of Medical Microbiology, University Hospital Galway, Galway	Clinical Microbiology
National Virus Reference Laboratory (NVRL)	University College Dublin, Belfield, Dublin 4, Ireland	Clinical Microbiology
Neuroimmunology Dept	National Hospital for Neural and Neurosurgery, Queen Square, London WC1N 3BG	Biochemistry
NHSBT Centre Bristol	NHSBT Centre, 500 North Bristol Park, Northway, Filton, Bristol, BS34 7QH, UK	Haematology
Nutristasis Unit	Haemostasis and Thrombosis GSTS Pathology4th floor, North Wing St Thomas' Hospital Westminster Bridge Road London SE1 7EH	Biochemistry
OLCH, National Centre for Medical Genetics (NCMG) Crumlin	Division of Cytogenetics (Oncology), National Centre for Medical Genetics (NCMG) , Our Lady's Hospital, Department of Clinical Genetics, Children's Health Ireland at Crumlin Dublin D12 N512	Biochemistry
Oxford University Hospitals NHS Foundation Trust	National Haemoglobin Reference Laboratory, Oxford Haemophilia Centre, Churchill Hospital, Oxford OX3 7LJ	Haematology

Name	Address	Referring Dept
Oxford Genetics Laboratories	Oxford Regional Genetics Laboratories, Churchill Hospital, Headington, Oxford, OX3 7LE, United Kingdom	Haematology
Oncology Cytogenetics	Cytogenetics Oncology, 5th Floor Tower Wing, Guy's Hospital, Great Maze Pond, London, SE1 9RT UK Tel: 020 7188 1709	Haematology
Poundbury Cancer Institute	Dr Corrado D'Arrigo, Poundbury Cancer Institute, Dorset, United Kingdom	Pathology
Primary Ciliary Dyskinesia (PCD) Diagnostic Service, University Hospital Southampton	Patricia Goggin/Regan Doherty PCD EM Scientists Biomedical imaging Unit Mail point 12South Academic Block Southampton General Hospital UK SO166YD	Pathology
Public Health Laboratory, Cherry Orchard Hospital	PHL Cherry Orchard Hospital, Ballyfermot, Dublin 10	Clinical Microbiology
Purine Research Laboratory	Dr Lynette Fairbanks, 4th Floor, North Wing, St. Thomas's Hospital, London SE1 7EH	Biochemistry
Rare and Imported Pathogens Laboratory (RIPL)	UK Health Security Agency, Porton Down, Salisbury, Wiltshire SP4 0JG, England	Clinical Microbiology
Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU)	Bacteriology Reference Department, UK Health Security Agency, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology, Biochemistry
Rotunda Hospital	Rotunda Hospital , Parnell Street, Dublin 1, DO1 P5W9	Haematology
Royal Free Hospital HSL	Haematology Laboratory, Royal Free Hospital HSL Analytics LLP, Katharine Dormandy Haemophilia Centre and Thrombosis Unit First Floor, Royal Free Hospital, Pond Street, London NW3 2QG, U.K.	Haematology
Royal Marsden Hospital NHS Foundation TR	RMH HMDS, The Centre for Molecular Pathology, The Royal Marsden NHS Foundation Trust, Cotswold Road, Sutton, Surrey, SM2 5NG	Haematology
Salamanca University	Hospital Universitario, Paseo de San Vincente, 58-182, 37007 Salamanca, Spain. Samples sent from haematology	Haematology
SAS Centre	c/o Ground Floor Oncology Charing Cross Hospital Fulham Palace RoadLONDONW6 8RF	Biochemistry
SAS Peptide Hormones, Royal Surrey County Hospital	Clinical Laboratory, Royal Surrey County Hospital, Egerton Road,GUILDFORDGU2 5XX	Biochemistry
SAS Trace Element Unit	Division of Laboratory Medicine Southampton University Hospitals NHS Trust Mail Point 804Southampton General Hospital Tremona RoadSOUTHAMPTONSO16 6YD	Biochemistry
Sexually Transmitted Bacteria Reference Laboratory (STBRL)	Bacteriology Reference Department, UK Health Security Agency, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
Sheffield Diagnostic Genetics Service	Sheffield Children's NHS Foundation Trust Western Bank, Sheffield S10 2TH Sheffield Diagnostic Genetics Service, C Floor Blue Lifts, Sheffield Children's NHS Foundation Trust, Clarkson Street, Sheffield, S10 2TQ	Haematology

Name	Address	Referring Dept
TDL Genetic Referrals	The Doctor's Laboratory Genetics,60 Whitfield Street, London W1T 4EU	Biochemistry
The Antimicrobial Resistance and Healthcare Associated Infections Reference Unit (AMRHAI)	Bacteriology Reference Department, UK Health Security Agency, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
The Diagnostic Parasitology Laboratory	The Diagnostic Parasitology Laboratory, Faculty of Infectious & Tropical Dieases, London School of Hygiene & Tropical Medicine, Keppel Street, Loncon WC1E 7HT.	Pathology
Thyroseq International	University of Pittsburg Medical Centre, 200 Meyran Ave # 318, Pittsburgh, PA 15213, United States	Pathology (Cytology)
Toxicology Laboratory, Beaumont Hospital	Beaumont, Dublin 9	Biochemistry
Toxoplasma Reference Laboratory (TRL)	Singleton Hospital, Swansea SA2 8QA, Wales	Clinical Microbiology
Trace Element Laboratory	Centre of Clinical Science & Measurement, School of Biological Sciences, University of Surrey, Guildford GU2 5XHEndocrine Laboratory	Biochemistry
Trace Element Unit, King's Healthcare Trust	Dr Raja, Trace Element Unit, Dept. of Clinical Biochemistry King's Healthcare Trust Denmark Hill London, SE5 9RSEngland	Pathology
UKHSA Mycology Reference Laboratory	UKHSA South West Laboratory, Science Quarter, Southmead Hospital, Bristol BS10 5NB, England	Clinical Microbiology
Viapath, GSTS Pathology	Viapath, GSTS Pathology Centre, The Human Nutristasis Unit, Haemostasis Laboratories, 4th Floor North Wing, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH, United Kingdom	Haematology
Virology Reference Department	UK Health Security Agency, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
Wessex Regional Genetics Laboratory	Leukaemia Research Group, Wessex Regional Genetics Laboratory, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ	Haematology
Wellchild Laboratory	Wellchild Research Laboratory, 12th floor, Guy's Hospital, London SE1 9RT	Biochemistry
Willink Biochemical Genetics Unit	Genetic Medicine, 6th Floor, St Mary's Hospital, Oxford Road, Manchester M13 9WL	Biochemistry