



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive



Ospidéal Ollscoile Chorcaí
Cork University Hospital

CORK UNIVERSITY HOSPITAL LABORATORY MEDICINE USER HANDBOOK

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

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N	O	P	Q	R	S	T	U	V	W	X	Y	Z

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Approver(s): Dr Bartley Cryan, Mr Brendan O'Reilly	Approval Date: 07/09/2017 07/09/2017	

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2 AMENDMENT TABLE

The Laboratory Medicine User Handbook is controlled in accordance with local quality management system requirements. The amendments to this and the previous revision are listed on 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
3 Introduction	
4 General information	
<ul style="list-style-type: none"> 4.1 The location of the laboratory 	Text added: "Infectious Diseases Serology. Located on the ground floor, opposite Physiotherapy department."
<ul style="list-style-type: none"> 4.2 Opening Hours and Laboratory Telephone Extension Numbers 	Haematology: Added Haematinics and Haematology Reception extension numbers Microbiology: Antibiotic assays added to Microbiology Main Laboratory.
<ul style="list-style-type: none"> 4.3 Contact Details 	<ul style="list-style-type: none"> General Laboratory: Remove Brendan O'Reilly and add Sinead Creagh Biochemistry: remove Dr Maria Fitzgibbon and add Dr Sean Costello Blood Transfusion: Updated conact details of BT & HV personnel Haematology: added Dr Norma Reidy as Chief Medical Scientist at extension 22544 and corrected Ms Mary Ring's number to 22544 Immunology Remove Peter Annis add Katherine Hooley Pathology: Remove Dr Adeline Chelliah and Gail O'Brien add Dr Susan Prendeville
<ul style="list-style-type: none"> 4.7 Instructions for transportation of samples, including any special handling needs 	Haematology Added: Samples for specialised coagulation must arrive into laboratory within 4 hours of phlebotomy.
7 Ordering of laboratory examinations	
<ul style="list-style-type: none"> Section 7.2 	Blood Transfusion: Make reference to the use of the CUMH MN_CMS system for BT specimens and request forms
<ul style="list-style-type: none"> Section 7.3 	Virology: Storage time changed from 4 weeks to 1 week from reception date. The following text was deleted "However, samples >48 hours are not suitable for additional antibiotic assay."
<ul style="list-style-type: none"> Section 7.5 	Microbiology (Virology): The following text was deleted. " <u>Clotted Blood for Antibiotic Assay</u> " Specimens must be sent to the laboratory within 2 hours of venepuncture. Any delay may affect the accuracy of the final result."
8 Sample Collection	
<ul style="list-style-type: none"> Section 8.2 	Virology: "All abnormal antibiotic assay results" deleted, and the following tests entered, Toxoplasma IgM, EBV IgM, CMV IgM, Parvovirus IgM, Rubella IgM, Leptospira IgM, <i>Mycoplasma pneumoniae</i> IgM, urinary antigens, RSV antigen.
<ul style="list-style-type: none"> 9.4 Healthlink Messaging - Electronic delivery of laboratory reports to the GP practice 	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 info@healthlink.ie

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10	Information Technology	
	<ul style="list-style-type: none"> Section 10.5.3 	Ensure that labels printed match the details of patient identified for phlebotomy. Ensure labels are affixed to correct bottles. Do not cover specimen blood volume or container 'fill to' marks.
12	Blood Transfusion	Updating BT Laboratory 2016 data. Make reference to the use of the CUMH MN_CMS system for BT specimens & Request Forms. Updating plasma storage and thawing parameters. More clarity to collection process of blood components. Split Haemovigilance section into General HV and section specifically for HV Training and Policies including requirement for clinical staff to attend HV training and referencing the clinical HV documents.
13	Test Directory (A-Z)	
	- ADAMTS13	Added that samples can only be referred to UCL Monday or Tuesday (via Biomnis)
	- Adenovirus Immunofluorescence	Deleted.
	- Antenatal Screen	Comment: "Varicella-zoster virus (VZV) IgG" added. Report: "(IU/mL for Rubella IgG)" added.
	- Antibiotic Assays	Laboratory changed to Microbiology (Virology deleted).
	- Arthralgia Screen	Deleted.
	- Atypical Pneumonia Screen	Deleted.
	- <i>Bartonella henselae</i> and <i>quintana</i> antibodies (IgG and IgM)	Deleted.
	- Blood Group and Crossmatch	Included reference to "Add On" requests for crossmatched blood.
	- Ceruloplasmin	Changed ref range to : 0.18-0.58 g/L
	- CSF (Culture and Sensitivity)	Transport ASAP, directly to the laboratory
	- Cryptosporidium spp. and Norovirus	Added a comment: 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.
	- ESR add-on	Corrected to 24 hours
	- Exanthem Screen	Deleted.
	- Flow Cytometry	"Do not refrigerate" changed to "Samples may be refrigerated overnight. Optimal sample age less then 48 hours"
	- Full Blood Count Reference intervals	Added exact ages to the table. Addes Note: 6ml purple EDTA Vacuette or any other sample type is unsuitable for FBC
	- G6PD add-on	Added 24 hours
	- Haptoglobin	Changed ref range to : 0.44-2.15 g/L
	- Heparin /PF4 Antibody Test (HIT; Heparin Induced Thrombocytopenia screening test)	Request form must be completed and the site to access this is added.
	- Hepatitis A Total Antibody	Changed to Hepatitis A IgG Antibody.
	- Hepatitis B Viral Load	Deleted.
	- Hepatitis C Viral Load	Deleted.
	- Human Immunodeficiency Virus (HIV) Viral Load	Deleted.
	- Human Metapneumovirus Immunofluorescence	Deleted.
	- Human Metapneumovirus Molecular	Deleted.
	- Influenza A and B	Deleted.

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Immunofluorescence	
- Influenza A and B Molecular	Deleted.
- Intra-Uterine Infection Screen / TORCH Screen	Text edited to reflect that Parvovirus B19 IgM performed in house. Turnaround time changed to 36 hours.
- JAK 2 Exon 12	May also be sent to Oncology Cytogenetics, 5th Floor Tower Wing, Guy's Hospital, Great Maze Pond, London SE1 9RT
- <i>Legionella pneumophila</i> Total (IgG + IgM) Antibodies	Deleted.
- Lupus tests	Added: Samples without Clinical details WILL NOT be processed.
- Lyme Serology	Turnaround time changed to 36 hours.
- Lymphoma Granuloma	Deleted.
- Measles IgG Antibody	Text edited to reflect that test is performed in house. Turnaround time changed to 36 hours.
- Mumps IgG Antibody	Text edited to reflect that test is performed in house. Turnaround time changed to 36 hours.
- Mycobacteria Testing	Blood culture: 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 (1-5mL of blood or marrow). Removed details of the addition of culture enrichment within 24hours of bottle inoculation
- <i>Mycoplasma pneumoniae</i> IgM	Turnaround time changed to 36 hours.
- PAI-1 (Plasminogen Activator Inhibitor)	PAI1 only needs Citrate samples, deleted clotted samples from requirements
- Parainfluenza Immunofluorescence	Deleted.
- Parainfluenza Molecular	Deleted.
- Parvovirus B19 IgG and IgM	Text edited to reflect that Parvovirus B19 IgG and IgM performed in house. Turnaround time changed to 36 hours.
- Prothrombin Tim	Added samples must be received within 48hrs
- Protein S Reference Range	Added revised Reference adult interval Male: 68 - 143%, Females: 60 - 114% and age ranges
- Respiratory Syncytial Virus (RSV) Immunofluorescence	Deleted.
- Respiratory Syncytial Virus (RSV) Molecular	Deleted.
- Respiratory Viral Screen (Immunofluorescence)	Deleted.
- Respiratory Viral Screen (Molecular)	Now performed in CUH during 'Influenza season' and referred to NVRL outside of 'Influenza season'.
- Rubella IgG Antibody	Report: Changed to "Quantitative value IU/mL".
- Swine Flu	Deleted.
- Thrombophilia tests, (PC, PS, APCR ATIII) lupus tests, Factor assays, Inhibitor screen	Added the comment Samples must be received within 4 hours.
- Urine Culture	. Culture will only be carried out where WCC is >20/cmm., but the following are cultured in all cases; Antenatal, <16 year, Renal, ICU, potentially immunocompromised.
- 25 OH Vitamin D	TAT change from 3 weeks to 10 days.
- C3 C4	Changed ref range to C3: 0.87-2.0 g/L C4: 0.19 - 0.52 g/L
Whole Document	All references to "Virology" changed to "Infectious Diseases Serology".

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3 INTRODUCTION

3.1 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. Regrettably 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.

3.2 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.

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3.3 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.

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4 GENERAL INFORMATION

4.1 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

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.
4.	Haematology and Coagulation	Ground floor, Laboratory building
	• Haematinics	Ground floor, by outpatients
	• Molecular Genetics	Ground floor on the link corridor between outpatients and laboratory reception
5.	Pathology	
	• Histopathology	First Floor, Laboratory building (Swipe access only)*
	• Cytopathology	
	• Electron Microscopy /Renal	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.

*It is advisable that external couriers have contact numbers for laboratories, as laboratories are swipe access only.

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4.2 Opening 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".	
Medical Scientist On-call	Bleep:199		

Clinical Biochemistry	Contact No	Opening Hours	Sample Deadline
Clinical Biochemistry	Ext. 22528	08:00-20.00 Mon-Fri	16:30 Mon-Fri
Endocrinology / Tumour Markers	Ext. 22528	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.	
Molecular Genetics	Ext. 22361 /22531		
Therapeutic Drug Monitoring (TDM)	Ext. 22528		
Specific Proteins / Immunology	Ext. 22535	Please note: All genetic testing requires consent.	
Medical Scientist on call	Bleep: 253		

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		
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 Mon-Fri, and 09:00 to 12:00 Sat	16:30 Mon-Fri 12 :00 Sat

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Main Laboratory Haematinics Specimen reception	Ext. 20172 Ext. 22128 Ext. 22547	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)	Ext:22792	08:00-18:00 Mon-Fri 09:00 12:00 Sat	17:30 Mon-Fri
Secretariat	Ext:22514 / 22510	08:00-18:00 Mon-Fri	Fixed & unfixed specimens
BreastCheck	Ext:20497	08:00-18:00 Mon-Fri	11:45 Sat.
Deirdre Galvin (Admin. Officer)	Ext:22883		Fixed specimens only
Cytopathology	Ext. 22511	9am 5pm Mon Fri No service on Sat	4.30pm
Specimen Reception	Ext. 22792		
Consultant Pathologist	Ext.22514/ 22510		
Post Mortem /Mortuary Services	Ext. 22525 /22883	24 hour service	11am cut-off
Renal Pathology/Electron Microscopy	Ext 21315 Bleep: 379	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

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4.3 Contact Details

Name	Position	Tel Ext.	E. mail
General Laboratory Medicine			
Ms Sinead Creagh	Laboratory Manager (interim)	22532	sinead.creagh@hse.ie
Mr Paul Cantwell	Laboratory Quality Manager	20089	paul.Cantwell@hse.ie
Ms Brid O'Mahony	Laboratory Information Systems Leader	20150	brid.OMahony1@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 Susan O'Shea	Consultant Haematologist	22545	Susan.OShea@hse.ie
Dr Derville O'Shea	Consultant Haematologist	22548	Derville.OShea@hse.ie
Dr Vitaliy Mykytiv	Consultant Haematologist	20111	Vitaliy.Mykytiv@hse.ie
Mr John Sheehy	Chief Medical Scientist	20346	John.Sheehy@hse.ie
Ms Bríd Doyle	Specialist Medical Scientist: Haemovigilance Co-ordinator	22668	Brid.doyle@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 Costello	Consultant Clinical Biochemist	22530	
Mr Mark Butler	Chief Medical Scientist	22809	Mark.Butler@hse.ie
Ms Caroline Joyce	Principal Clinical Biochemist	22531	caroline.joyce@hse.ie
Department of Clinical Microbiology			
Dr Bartley Cryan	Consultant Microbiologist	22500	Bartley.Cryan@hse.ie
Dr Dan Corcoran	Consultant Microbiologist	20120	Dan.Corcoran@hse.ie
Prof Michael Prentice	Consultant Microbiologist	4901246	michael.prentice@hse.ie
N.C.H.D.s	Microbiology Registrars / SHO	22504 / 22694	
Ms Louise Barry	Chief Medical Scientist (Interim)	22502	Louise.barry1@hse.ie
Dr Declan Spillane	Chief Medical Scientist (Infectious Diseases Serology)	22506	Declan.Spillane@hse.ie
Ms Carmel Hooton	Surveillance Scientist (Interim)	20089	Carmel.hooton@hse.ie
Medical Scientist on call Bleep No:		375	
Department of Haematology and Coagulation			
Prof Mary Cahill	Consultant Haematologist	22546	MaryR.Cahill@hse.ie
Dr Susan O'Shea	Consultant Haematologist	22545	Susan.OShea@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	20111	Vitaliy.Mykytiv@hse.ie
Ms Mary F. Ring	Chief Medical Scientist	22544	MaryF.Ring@hse.ie
Dr Norma Reidy	Chief Medical Scientist	22544	Norma.reidy@hse.ie

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Name	Position	Tel Ext.	E. mail
Mr Damien Hennessy	Chief Medical Scientist (Cryobiology)	21351	Damien.Hennessy@hse.ie
Ms Hilary Morton	Senior Phlebotomist	22415	hilary.morton@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 John Hogan	Consultant Histopathologist	22522	johnm.hogan@hse.ie
Dr Tara Jane Browne	Consultant Cyto/Histopathologist	20087	tarajane.browne@hse.ie
Dr Mary Hayes	Consultant Cyto/Histopathologist	22886	mary.hayes4@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 James Fitzgibbon	Consultant Histopathologist	20487	james.fitzgibbon@hse.ie
Dr Nick Mayer	Consultant Histopathologist	20488	nick.mayer@hse.ie
Dr Cynthia Heffron	Consultant Histopathologist	20485	cynthia.heffron@hse.ie
Dr Brendan Fitzgerald	Consultant Histopathologist	20135	brendan.fitzgerald@hse.ie
Dr Brian Hayes	Consultant Histopathologist	22523	Brian.Hayes@hse.ie
Dr Niamh Conlon	Consultant Histopathologist	22454	Niamh.Conlon1@hse.ie
Dr Susan Prendeville	Consultant Histopathologist	22589	Susan.Prendeville@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
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.			

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4.4 Availability of clinical advice on ordering of examinations and on interpretation of results

1. 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 4.3).
2. Interpretation and clinical advice is provided on the report where appropriate.
3. Refer to section 5.0 for further information regarding the ordering of examinations.
4. 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.
5. 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.

4.5 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 officers:

- <http://www.hse.ie/eng/services/yourhealthservice/feedback/Complaints/Officers/Hospital/South.html>

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:

- ['Your Service, Your Say' The Policy and Procedures for the Management of Consumer Feedback to include Comments, Compliments and Complaints in the HSE \(.pdf - 2812 KB\)](#)

4.6 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 Acts 1988 & 2003. The HSE has a responsibility to ensure that this personal data is;

- obtained fairly
- recorded correctly, kept accurate and up-to-date

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- 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 Acts 1988 and 2003 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/>

4.7 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.

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.

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5 TYPES OF CLINICAL SERVICES OFFERED BY THE LABORATORY

5.1 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 Erythematosus 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.

5.2 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

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- Specific proteins, e.g. immunoglobulins, allergies, acute phase proteins
- Therapeutic drugs
- Cardiac markers
- Toxicology
- Molecular 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 molecular genetic investigations, contact Principal Biochemist (ext 22531).

5.3 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.
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.

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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
 - Specimens for the detection of gonococci (keep GC specimens at room temperature)
 - 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.

5.4 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) 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 Cork Institute of Technology (CIT). Members of staff regularly teach at both institutions. In addition an

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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. Full Blood Counts

- Routine FBC which consists of a full blood count and white cell differential and Reticulocyte Count and Nucleated Red Blood Cell Counts in newborn babies.
- The investigation of possible Haemolytic Anaemias includes the following tests: FBC (including the percentage of hyperchromic RBCs), Reticulocyte Count, RBC morphology
- ESR

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.
- Thrombophilia Screen: 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, see BCSH Guidelines.
- Lupus Anticoagulant screen: PT, APTT, Fibrinogen assay, AFSL, and DVVT

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.

3. Thrombophilia

Indications: Check BCSH guidelines published December 2010 to prevent unnecessary testing of patients, copy and paste following link to browser for guidelines: www.bcsguidelines.com/documents/Heritable_thrombophilia_bjh_07_2010.pdf

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.

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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 fluochrome-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
- HbA2 Quantitation
- Hb Electrophoresis
- Hb F Quantitation
- HbS 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. Autologous Stem Cell Storage and Reinfusion:

This is a clinical Haematology service used in the treatment of patients with Leukaemia, Lymphoma, and Myeloma. For further information contact the Consultant Haematologist.

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.

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5.5 Department of Pathology

Pathology is a comprehensive consultant led service, which includes Histopathology, Frozen Section, Direct Immunofluorescence, Electron Microscopy, Diagnostic Cytopathology, Neuropathology 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 (not CUMH) 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

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 (Dr. Myra Cullinane) phone number is 086-2941446.

Cremation

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

The Funeral Director/Anatomical Pathology Technician will liaise with the appropriate doctor who will complete the Medical Certificate Form (Form C).

Alternatively, if the death is a Coroner's case, Form D will be completed by the Coroner.

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).

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Request / 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 Request/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 fetuses >12 weeks gestational age, the protocol is as for an adult (see above section). Fully informed signed consent of the parent is required.

In the case of a fetus from a miscarriage \leq 12 weeks gestation or in the case of any specimen which may contain a fetus or fetal tissue from this gestational age a "Consent to pathological examination of a fetus of \leq 12 weeks gestational age" form (FOR-CUH-PAT-1627) needs to be completed and submitted to the pathology department. For full details of the protocol, contact the Histopathology Dept. at (021) 4922792.

Neuropathology

Neuropathology provides a Consultant -provided quality diagnostic service mainly to Cork University Hospital for Neurosurgery, Neurology and Specialised Ophthalmology, outside referrals for approximately 1/3 of the country including all of the Cork hospitals, Tralee and Bantry and referrals from Limerick.

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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 and 14-3-3 protein, 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). 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)

5.6 Point of Care Testing

The Executive Management Board (EMB) of CUH has established the Quality Safety Policy Evaluation Group (QSPEG) as the vehicle for the delivery of Clinical Governance throughout the Hospital. The EMB has also decided to adopt the Laboratory Medicine Policy Document for POCT, which was prepared for Accreditation, as hospital policy.

The Hospital Point of Care Committee has been established with similar terms of reference and standing as the Transfusion Committee or the Infection Control Committee to ensure the safe use of POCT with adequate guidelines to meet Patient Safety / Risk Management and Medico Legal concerns.

This means that the strict guidelines outlined in the Laboratory Medicine document, Point of Care Testing, are now the only accepted and appropriate way for the conduct of POCT activities at CUH.

Blood gas analysers and glucose meters situated outside the laboratory give high quality results if used and maintained correctly. Do NOT use this equipment unless you have been trained. Training courses are organised periodically by the Clinical Biochemistry

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Laboratory. Follow the instructions for the disposal of waste in order to minimise health, safety and cross infection risks.

1. Blood Gas Analysers - Blood Gas Analysers are located in Intensive Care (General and Cardiac), Theatre, CUMH Neo Natal Units and Labour Wards.
2. Blood Glucose Meters - Blood Glucose Meters are located throughout the Hospital to monitor known diabetics. These are not to be used for the diagnosis of diabetes mellitus, for which a blood specimen must be sent to the laboratory.

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6 INSTRUCTIONS FOR PATIENT-COLLECTED SAMPLES

6.1 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.

6.2 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

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into the toilet. Some specimen bottles contain boric acid preservative (red top container with white powder in it). Do not discard the white powder. Fill boric acid container to the line marked, close the lid and mix well. This gives the correct concentration of preservative. Do not use urinary dipstick on boric acid samples as this leads to erroneous results.

7. 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.
8. 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.
9. Wash and dry hands thoroughly with soap and warm water.

6.3 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.

6.4 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

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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.

6.5 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

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7 ORDERING LABORATORY EXAMINATIONS

7.1 Instructions for completion of the request form

- 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.
- 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.
- The electronic request using iSOFT Clinical Manager (iCM): Refer to section 10: Information Technology.
- 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:
 - Patient's Full Surname and Forename
 - 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.
 - Patient's Date of Birth
 - Patient's Sex and Title
 - Date and time of specimen collection
 - Name of the Requesting Consultant
 - Location to where the results should be reported
 - Type of specimen collected and if appropriate, the anatomical site of origin or tick the relevant box
 - Clinical information relevant to or affecting sample collection, examination performance or result interpretation (e.g. history of administration of drugs).
 - Name and bleep number of requesting doctor
 - Analysis required
- 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.
- Clinical details and relevant treatment information and details of foreign travel are extremely useful to the laboratory in interpreting results.
- 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.

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7.2 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.

7.2.1 Biochemistry, Haematology, Microbiology, Pathology		
Labelling Requirements*	Essential Information	Desirable Information
Request Form	<p>Patients full name or proper coded identifier**</p> <p>D.O.B. and/or Patient's Medical Record Number (MRN/RID)</p> <p>Patient's location or destination for report or patient's consultant or GP</p> <p>Specific requirements of individual departments:</p> <ul style="list-style-type: none"> Biochemistry /Haematology /Microbiology: Test Request Pathology/Cytopathology <ul style="list-style-type: none"> Requesting Clinician, Patient's address, Patient's location, Nature and site of specimen (including Right or Left) Destination for report Clinical Information 	<p>Patient's address</p> <p>Patient's sex</p> <p>Clinical details, relevant therapy and foreign travel (antibiotic treatment important for Microbiology), travel and prophylaxis history for Malaria</p> <p>Date and time of specimen collection (timing in relation to antibiotic dose essential for Antibiotic Assays and for some Chemical Pathology tests)</p> <p>Pathology:</p> <p>Date and time specimen taken.</p> <p>Previous relevant Histopathology Numbers (CUH/MUH) if applicable).</p> <p>Signature of clinician / nursing staff (pp)</p> <p>Clinician's bleep number</p>
Sample	<p>Patients full name or proper coded identifier**</p> <p>D.O.B. and/or Patient's Medical Record Number (MRN/RID)</p> <p>All non-blood samples: sample type or exact site</p> <p>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.</p>	<p>Pathology: Date and time specimen taken.</p>
Requests using iCM	<p>Samples requested using iCM have no accompanying forms.</p> <p>Details must be complete on the sample container.</p>	

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

**e.g. HIV specimens

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7.2.2 Blood Transfusion

Labelling Requirements*	Essential Information	Desirable Information
Request Form	<p>Addressographs on forms <u>not</u> accepted.</p> <p>Patient's Forename[§]</p> <p>Patient's Surname[§]</p> <p>Patient's Sex</p> <p>D.O.B.</p> <p>Medical Record Number (MRN/RID)</p> <p>Patient Address for Out-patients.</p> <p>Destination for report.</p> <p>Patient's consultant or GP.</p> <p>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).</p> <p>Date and time of specimen collection.</p> <p>Tests Required.</p> <p>[§]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.</p> <p>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.</p>	<p>Clinical details.</p> <p>Previous address & patient's maiden name</p> <p>Transfusion & obstetric history & relevant therapy.</p>
Sample	<p>Addressographs on samples <u>not</u> accepted.</p> <p>Patient's Forename[§]</p> <p>Patient's Surname[§]</p> <p>Patient's Sex</p> <p>D.O.B.</p> <p>Medical Record Number (MRN/RID).</p> <p>Identity of person taking the samples</p> <p>Date and time of specimen collection.</p> <ul style="list-style-type: none"> [§]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. <p>Note: the CUMH uses the MN_CMS Millennium Electronic record. Transfusion specimen labels generated</p>	

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	correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department.	
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

7.3 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 time limits for requesting additional examinations or further 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	<p>The time limit for requesting additional examinations is generally within 7 days subject to individual analyte stability and dependant on storage facilities. Certain tests have a limited stability:</p> <ul style="list-style-type: none"> • Anti-TPO • CK • CSF • Total and Direct Bilirubin • Phosphate • LDH • HCG-B • Oestradiol • Troponin • SHBG • PTH <p>Please contact the laboratory with any queries.</p>
Haematology	<p>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 if in doubt. The following is not an exhaustive list:</p> <ul style="list-style-type: none"> • Retics on FBC specimens <12 hours post phlebotomy • ESR 24 hours • Blood Films: Manual differential 12 hrs, slide Platelet 72 hrs and Red cell morphology 12 hrs • DDI on Coagulation Sodium Citrate <24 hours post phlebotomy • APTT on Coagulation, Sodium Citrate specimens <4 hours post phlebotomy • Thrombophilia assays: contact laboratory • 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

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	<ul style="list-style-type: none"> Fibrinogen <12 hours post phlebotomy Malaria on an FBC sample (12 hours of phlebotomy) Kleihauer: the time limit is 72 hrs post delivery G6PD 24 hours
Microbiology	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.
Molecular Genetics	Factor V Leiden and Prothrombin gene mutations - add on not possible as separate specimens always required for genetic testing

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

7.4 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

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8 SPECIMEN COLLECTION

8.1 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.

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

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have results that are higher or lower than those in the reference range. Therefore, laboratory results should be 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.

8.2 Phlebotomy Service at Cork University Hospital

Senior Phlebotomist: Ms Hilda Forde

Contact Numbers: Phone: 22415 (Blood Room) Bleep no: 287

Phlebotomy is based in the Out-Patients Department.

Wards: The service is Monday to Friday.

7:30am to 12:15pm

1.45pm to 3.30pm (for pre-operative blood tests only).

Clinics: The service is Monday to Friday.

8:30am to 1:00pm

1:30pm to 4:00pm

4:00pm to 5:00pm ((limited services for out-patient clinics only)).

Weekend /Bank Holiday: 7.30am to 10.30am (for non-routine bloods, limited services).

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.

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8.3 Phlebotomy blood collection order of draw

Specimen Volume	Order Of Draw	Closure Colour	Tube Contents	Assays
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), Copper and Zinc levels.
4ml		Red	Clotted (Gel free)	Cryoglobulins, Methotrexate
4ml		Green	Heparin	Chromosomes, Lead Levels, DNA Analysis
3ml		Purple	EDTA	FBC, HBA1C, Hb. Electrophoresis, Malaria Parasites, Sickle Cell, Reticulocyte Count, Coombs Test, Cyclosporin, Tacrolimus ESR, Immunophenotyping, PTH, Cryoglobulins
6ml		Pink	EDTA	Crossmatch, Group & Antibody Screen
4ml		Grey	EDTA sodium fluoride	Glucose, Glucose Tolerance, Lactate, Alcohol Levels
9ml		Yellow	ACD-A	HLA Typing

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8.4 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	Send on ice
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 (red top)	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 poat birth
Mycophenolate	EDTA	1ml	Spin <6hrs

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8.5 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. Addition of test requests to existing samples is not recommended due to issues of sample integrity. Contact individual laboratory for advice.

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) – 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. Samples specifically for the isolation of *Neisseria gonorrhoea*. (i.e. cervical or urethral specimens) should be stored at room temperature. The viability of *N. gonorrhoeae* is lost over time.
- d. Faeces Samples for Ova, Cyst and Parasite investigation should not be refrigerated (should be stored at room temperature).

Microbiology (Infectious Diseases Serology)

Clotted Blood and EDTA Blood for Molecular Investigations

Serum and plasma must be removed and frozen at $\leq -20^{\circ}\text{C}$ by the laboratory within 24 hours of venepuncture to maintain the integrity of the viral genetic material. 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.

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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.

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9 REPORTING OF RESULTS

9.1 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.

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9.2 Critical Results Reporting

Biochemistry				
Test	Result		Test	Result
ALT IU/L	>600		Magnesium mmol/L	<0.4
Ammonia µmol/L	>100 (neonate) >40 (infant/child)		Sodium mmol/L	<120 >150
Amylase IU/L	>750		Paracetamol mg/L	>98
Calcium mmol/L	<1.8, >3.0		Phenobarbital mg/L	>70
Carbamazepine mg/L	>25		Phosphate mmol/L	<0.35
Cortisol nmol/L	<150		Phenytoin mg/L	>28
Creatinine µmol/L	>400 (200 if <16 yr)		Salicylate mg/L	>296
CK IU/L	>5000		Theophylline mg/L	>20
Digoxin ug/L	>2.4		Triglyceride mmol/L	>20
Glucose mmol/L	<2.5, >25		Urea mmol/L	>30(> 10 if <16 yr)
Potassium mmol/L	<2.5, >6.5		Valproate mg/L	>130
Lithium mmol/L	>1.5			
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 1 st time)
Kliehauers	Foetal bleed >12 mls		Fibrinogen	<1.0
APTT	Results > 100 secs			
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 <u>pre-op</u> indicated on form				
Positive HCGs in hospitalised in-patients				
Urgent Factor assays				
Positive HIT screens				
Haemolytic Uremic Syndrome				
Newly diagnosed Leukaemia's				
Positive Malaria infections				
Positive Monospot Screening test				
Equivocal Pregnancy Tests				

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Microbiology
Microscopy <ul style="list-style-type: none"> Positive gram stains: blood cultures, CSF's and normally sterile body fluids, e.g. joint aspirates New ZN positive smears
Culture <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> New positive results: bacterial, viral or parasitic
Infectious Diseases Serology <ul style="list-style-type: none"> Positive results for HIV serology, Hepatitis C serology, Hepatitis B serology, Hepatitis A IgM, syphilis serology, Lyme IgM/IgG, Toxoplasma IgM, EBV IgM, CMV IgM, Parvovirus IgM, Rubella IgM, Leptospira IgM, <i>Mycoplasma pneumoniae</i> IgM, urinary antigens, RSV antigen.
Pathology
Frozen section reports
All positive temporal artery biopsies (Neuropathology)
Other reports at the discretion of the reporting Pathologist

9.3 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.
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).

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9.4 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 info@healthlink.ie.

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10 INFORMATION TECHNOLOGY

10.1 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

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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

10.2 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 Confidentiality Guidelines form.


10.3 Instructions for using Lab Enquiry/Netter™

1. Click once ** the "Yellow Telephone" icon  from toolbar
2. Enter Username and Password.
3. From Ward Enquiry Menu Screen select 1.

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4. From Ward Enquiry Screen 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
5. Under surname enter the first three letters of the patient's surname.

Note: If an MRN/RID is unavailable type "U" for unknown and press Enter. This brings you to the Patient Search screen. Enter the patients Surname, Forename and DOB. Press F10 and then press Enter to go onto Subject Search. From the Subject Search screen select the patient from list using Up and Down arrows. Press the F10 key

6. To search back from today's date for all results Press the F10 key then press Enter.
 7. At the Discipline prompt enter B for Biochemistry, H for Haematology or M for Microbiology and press Enter twice to only get results from that department.
 8. Arrow up, Arrow down keys to view all tests on the specimen report displayed
 9. Page up and Page down keys to view all reports on patient.
 10. When finished Press Enter to return to the Ward Enquiry search screen.
- NB -When finished search click this button  from toolbar to exit Lab Enquiry.

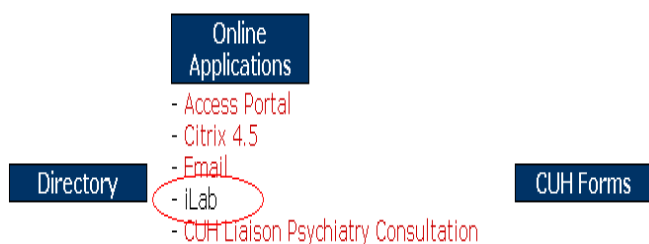
How To Change the Lab Enquiry Password (automatic account deactivation after three months if not updated)

1. Type UPASS in the main menu after logging on the system.
2. Enter your current password and new password twice.
3. The new password cannot be the same as the last and must contain at least five letters and one number.
4. Accept new password. This new password takes immediate effect.
5. 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.
6. If you have any problems changing your password contact the Laboratory Information Systems Helpdesk by e-mail at CUHIT.Pathology@hse.ie or by phone on 021-4920150

10.4 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>



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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 Date & 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 or by phone on 021-4920150

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10.5 iSOFT Clinical Manager (iCM)

iSOFT Clinical Manager (iCM) is the Order Communications System used within the CUH/CUMH campus. Any report that is generated on the Laboratory Computer System from Biochemistry, Auto Immune Serology, Haematology or Microbiology is available on iCM. This is provided that all parts of the request profile are authorised or the request is submitted using the RID and is not a viewer restricted test.

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/Us erGuides.asp

Logging on to iCM

Log into iPM

Select iCM Production

This opens the iCM Log-On Screen Log into iCM please note the Username format is different from Citrix 4.5 as it does not contain a dot between firstname and surname.e.g. If you log into Citrix 4.5 as test.frank then your ICM log in will be testfrank.

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10.5.1 Selecting a Patient

1. On logging into ICM the Patient List displays a list of current patients in a specified area.
2. 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.

10.5.2 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.

10.5.3 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

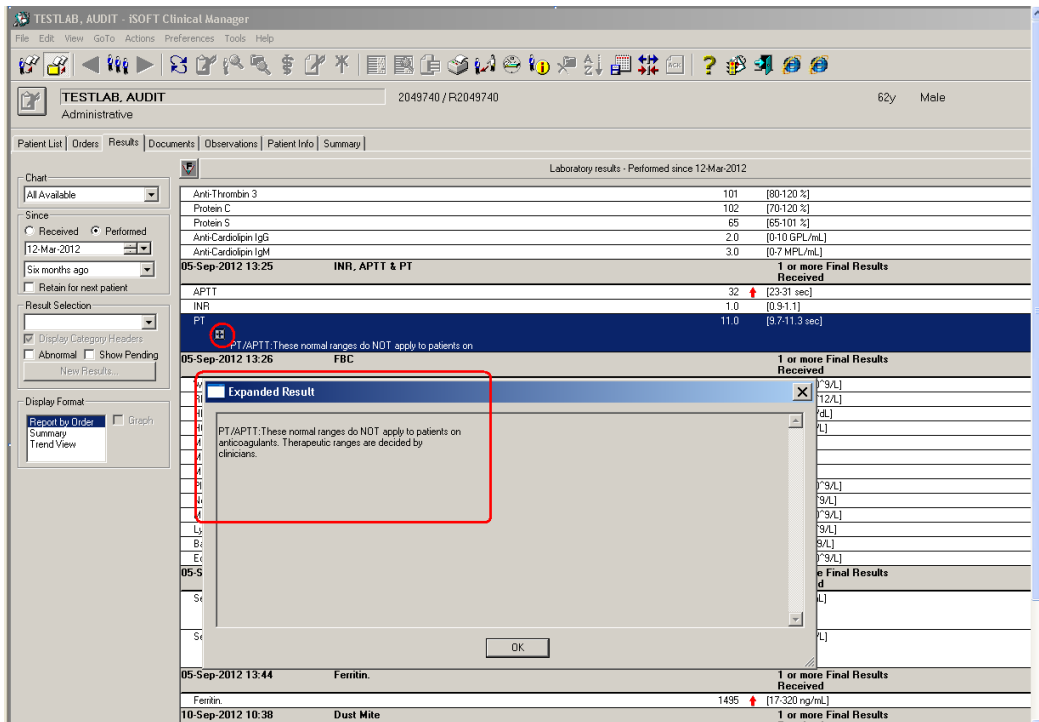
10.5.4 Results Viewing

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

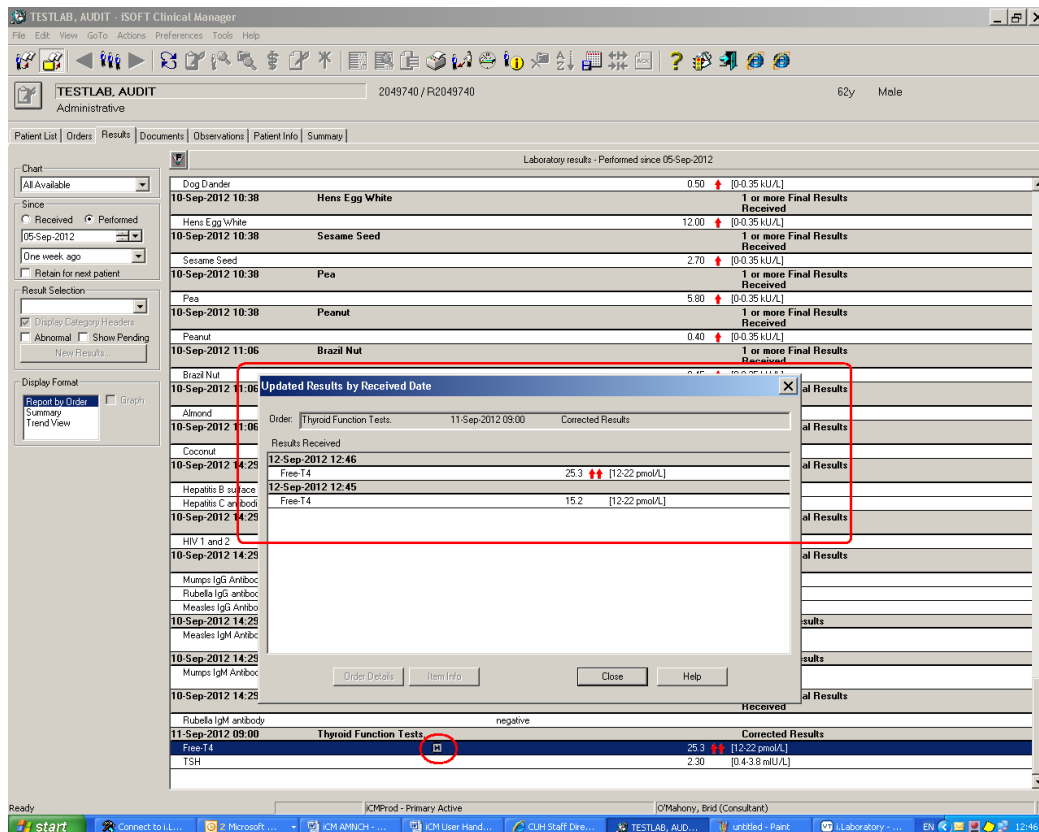
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A  button in a result field indicates that there is an expanded result –right click to view entire comment



The screenshot shows the TESTLAB, AUDIT - iSOFT Clinical Manager interface. The patient is 62y Male, ID 2049740 / R2049740. The results section shows various tests including Anti-Thrombin 3, Protein C, Protein S, Anti-Cardiolipin IgG, Anti-Cardiolipin IgM, INR, APTT & PT, and Ferritin. An expanded result window is open for PT/APTT, displaying a comment: "PT/APTT: These normal ranges do NOT apply to patients on anticoagulants. Therapeutic ranges are decided by clinicians."

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



The screenshot shows the TESTLAB, AUDIT - iSOFT Clinical Manager interface. The patient is 62y Male, ID 2049740 / R2049740. The results section shows various tests including Dog Dander, Hens Egg White, Sesame Seed, Pea, Peanut, Brazil Nut, and Thyroid Function Tests. An updated results window is open for Thyroid Function Tests, displaying results for Free T4 and TSH. The Free T4 result is 25.3 (12.22 pmol/L) and the TSH result is 2.30 (0.4-3.8 mIU/L).

This

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

10.5.5 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 Ward Enquiry/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 cuh.helpdesk@hse.ie


10.6 Instructions for using the Blood Collection System Through Lab Enquiry

Please note that the 'yellow' blood collection slip can ONLY be generated through the 'Lab Enquiry' Icon. Web Browser CANNOT be used.


If the Lab Enquiry icon is not available, Please contact the Blood Transfusion Department at 22537

Double click on Lab Enquiry icon for results

Click once ** the "Yellow Telephone" icon  from toolbar

- Enter Username: Press Return.
- Enter Password and press Return.
- From Ward Enquiry Menu Screen:
- Enter Option 1
- Press Enter.
- From Ward Enquiry Screen:
- At the Patient Number prompt type C for Cork PIMS registered patients followed by the patients Medical Record Number.
- Press Enter.
- If asked Type first three letters of patient's surname and press Enter.
- Go to the latest Haematology Result. This allows you to check the Haemoglobin result prior to transfusion, if applicable.
- Select the appropriate button for the product required from the upper tool bar (i.e. 'Collect BLOOD' to collect a unit of red cells or 'Col. PLATELETS' to collect a unit of platelets) and click once.
- When finished search click this button  from toolbar to exit Lab Enquiry.
- A yellow collection slip will be generated in the Laboratory, to be used as a collection identification slip by the person collecting the blood or blood product.

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- Bleep the porter/person collecting the blood and inform them that a unit of blood or blood product is to be collected on the required patient.
 - When the porter/person collecting the unit arrives in the laboratory to collect the unit of blood or blood product, they time-stamp the yellow collection slip.
 - The yellow collection slip is then brought to the ward with the blood/ blood product, where it is again time-stamped on receipt.
 - The nurse who receives the unit of blood at the ward then signs on the appropriate line on the yellow collection slip to verify receipt of the blood/ blood product.
 - When the unit of blood/ blood product is 'hung', the smaller sticky strip from the bar-coded patient identification label on the blood/blood product is stuck on the appropriate line on the yellow collection slip, and the nurse who has transfused the blood/blood product signs on the appropriate line.
 - The yellow collection slips are then collected and returned to the Blood Transfusion Laboratory, where they serve as transfusion confirmation records.
- NB -When finished search click this button  from toolbar to exit Lab Enquiry.

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11 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	✓	
Carbamazepine (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	✓	
Haemolysis Test	Blood Transfusion		✓
HIV1/2 antibody, HBsAg, HCV antibody (Needlestick Injury - Source)	Microbiology	✓	
HIV1/2 antibody, HBsAg, HCV antibody, Anti-HBs (Needlestick Injury - Victim)	Microbiology	✓	
INR	Haematology	✓	
Iron ²	Biochemistry		✓

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Test	Laboratory	Unrestricted	Restricted Requiring Consultation
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	✓	
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	✓	
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 and 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".
5. Sputa and swabs (excluding MRSA screens and HVS) marked "special attention" or "emergency" daily up to 8pm.
6. Prolactin requests will be processed only to exclude a prolactin-secreting tumour when emergency surgery is contemplated.
7. Troponin I requests which fulfil the agreed criteria.
8. All Coagulation Factor assays must be requested by prior approval by Consultant Haematologist On Call.

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12 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 standards and since that time has been accredited by the Irish National Accreditation Board (INAB) under scope 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 2016, 29,279 group and antibody screen specimens plus 1,861 infant blood group specimens were analysed with 8,201 units of red cells, 1,222 units of SD plasma and 1,646 units of platelets 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	Cold Agglutinins

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INAB Accredited Tests Available	Non INAB accredited Tests Available
Investigation (Blood Group + Antibody Screen +/- Antibody Identification + Crossmatch +/- Red Cell Phenotyping)	
Direct Coombs Test	Foetal Genotype
Phenotyping Red Cell Antigens	Haemolysin Test
	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

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.

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

On-call services: Only emergency samples are processed during on-call hours. 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.

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 BCSH 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, labeling errors) or patients requiring several crossmatches etc.

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Laboratory Requests:

Important considerations for blood transfusion laboratory requests:

- From the patient perspective, there are no specific requirements in terms of fasting etc. with regard to preparation prior to sample collection.
- Blood transfusion samples may only be taken by Doctors or specially trained Nurses/Midwives at CUH/CUMH.
- Request forms and samples for blood transfusion laboratory requests from all users of the service MUST be handwritten.
- **Note:** The CUMH uses the MN_CMS Millennium Electronic record. Transfusion sample labels & forms generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department.
- Essential information required on both samples and forms MUST include:
 - Patient's Forename
 - Patient's Surname
 - MRN (in case of GP sample where no MRN available the address 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.
- 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.
- 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.
- A fresh blood sample must be obtained 48 hours after commencement of a blood transfusion if a patient is to receive additional blood. Fresh blood samples are required from patients if they have been transfused or pregnant within the past 3 months. This "48hr rule" may be extended in pregnancy in certain cases to 7 days.
- 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).
- 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. Samples sent using the pneumatic chute system should be accompanied with a telephone call 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.

Ordering Frozen

- Products should be ordered by telephoning the CUH Blood Transfusion

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Plasma (e.g. Octaplas/Uniplas), Prothrombin Complex Concentrate (e.g. Octaplex), Paediatric Cryoprecipitate, Albumin and other Blood Products:

Laboratory 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 this form MUST be signed by the requestor.

- Plasma is stored at less than - 18°C and requires 30-45 minutes to be prepared depending on the number of units required. Once thawed, if not used within 4 hours, the Blood Transfusion Department must be contacted, as it may be necessary to discard the product.
- 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)	1. Reduce warfarin dose or stop.
INR result between 4.0-6.0 (target 3.5)	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 (e.g Octaplex) (50IU/kg) or Plasma (15 mL/kg) 3. Give 5mg of oral or I.V. Vitamin K

Ordering Platelets:

Contact the CUH Blood Transfusion laboratory and inform the laboratory staff of the platelet requirements.

Complete the blood product requisition form and send to the laboratory. Laboratory personnel may have to request a sample for 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.

Once labeled and prepared, the laboratory will contact the requesting location that the platelets are ready.

Requesting Additional Examinations:

Products should be ordered by telephoning the CUH Blood Transfusion Laboratory 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 this form MUST be signed by the requestor.

If requesting additional red cells it is important to note that from the commencement of a transfusion, the sample used for that crossmatch is only valid for a further 48 hours after which time a new sample is required. This is to check for the presence of developing red cell antibodies in the recipient following exposure to red cell antigens in donor blood.

The identity of the person requesting additional red cells should be made known to laboratory personnel.

Further tests on a specimen that is already in the laboratory can be requested by contacting the laboratory, where it will be established if the test may be possible.

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Storage and collection of Red Cells:

Red cells are stored between 2-6°C in temperature-controlled and monitored fridges.

When blood or blood products are required for a patient, the ward can generate a blood collection slip from certain designated PC terminals. This collection slip is printed in the laboratory and is used to identify the patient for whom blood is required, and as such is an integral part of the blood transfusion traceability system. Having first viewed the most recent haemoglobin result, the ward generates a collection slip for porters (which is printed in the laboratory). The ward then requests the porter to collect the blood or blood product. The porter collects the blood or blood product in accordance with current procedures. Training is provided to all staff involved in the collection of blood and blood components by CUH haemovigilance personnel. The collection slip then accompanies the blood or blood product to the ward, where it serves as the transfusion confirmation slip, which is then returned to the transfusion laboratory, when the blood or blood product has been transfused. Any queries in relation to this system of blood collection should be directed to Haemovigilance personnel or blood transfusion laboratory staff as described in this handbook.

Transfusion of red cells must begin within 30 minutes of the unit being removed from the designated blood storage refrigerator. If the transfusion has been deferred for any reason the blood must be returned to a designated storage fridge within 30 minutes. If the transfusion has not begun within 30 minutes the unit must be returned to the Blood Transfusion Laboratory for discard.

The transfusion should be completed within 4 hours of commencement of the transfusion to avoid the possibility of bacterial contamination of the unit.

Storage and collection of Platelets:

Platelets are stored between 20-24°C on a special platelet agitator in the blood transfusion laboratory.

Platelets are collected in the same process as described for red cells above. Platelets should not be stored at ward level and should be returned to the laboratory immediately if not being used.

Storage and collection of Plasma (e.g. Octaplas/Uniplas and Paediatric Cryoprecipitate).

These products are thawed in the laboratory upon request.

Once thawed, they are stored at room temperature (monitored) in the laboratory and it is recommended that they are used within 4 hours from thawing.

Collection of these blood products is as described for red cells above

Storage and collection of Albumin and other blood products:

Albumin (5% 500 mL) is stored at room temperature (monitored) in the laboratory.

All other products are stored between 2-8°C in temperature controlled and monitored fridges.

Collection of these blood products is as described for red cells above

Storage of samples in the Blood Transfusion Laboratory:

Original samples are stored for 1 week between 2-8°C.

Separated plasma samples are stored for approximately 3 weeks below -30°C.

Antenatal patient plasma samples containing antibodies are stored for the duration of the pregnancy approximately.

After this time, samples are disposed in accordance with local policies.

Emergency O

A limited number of O Rh (D) Negative Blood are available for EXTREME

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Rhesus (D)
Negative Blood: 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.

Blood
Transferred with
a patient from
an external
location: Any blood transferred to the CUH 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

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- 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 elearning 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 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). If the patient is to be discharged on the day of transfusion, the 'Having a Blood Transfusion-Patients Transfused on Day of Discharge- Information Leaflet for Patients and Guardians' (INF-CUH-CUH-15) should be given. (forms 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). There is also a policy covering the procedure for the taking of the pre-transfusion sample by nurses & midwives available on Q-Pulse. (PPG-CUH-NUR-7)

The procedure for the administration of blood & blood components is covered in the policy PPG-CUH-CUH-13, available on Q-Pulse.

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Results	<p>Results are issued in Hard Copy report format.</p> <p>Note: In the CUMH, transfusion results are available electronically through the MN_CMS Millennium Electronic Health Record.</p> <p>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.</p>
Advice and consultation:	Should clarification be sought on any issues related to the Blood Transfusion Laboratory service at CUH, queries may be directed to Blood Transfusion Laboratory or Haemovigilance personnel 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) and users can provide feedback 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.
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 2003 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	<p>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-system is in place and are requested to facilitate the laboratory by limiting requests to 'urgent requests' only, while IT systems are restored.</p> <p>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, while service is restored on site in CUH.</p>

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13 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:	1-2 days

ACTH

Laboratory:	Sample referred from CUH Biochemistry to BIOMNIS Laboratories
Specimen:	Special Tube (Aprotinin EDTA available from Biochemistry) on ice, must be frozen < 30 minutes
Comment:	Consultant request only
Turnaround:	3 weeks
Ref. Range:	See report form, or visit internet site www.biomnis.ie 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	28 - 43
	Day 180	36	28 - 43
	Adult	27	23 - 31

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)

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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.

Turnaround: 3 – 4 weeks (Refer to the main Haematology Section on Coagulation).

Ref. Range: Ratio ≥ 0.8 Negative

Ratio: 0.71 – 0.79 Inconclusive

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 Qualitative

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: Viral swab (eye, throat), stool, nasopharyngeal aspirate, sputum, broncho-alveolar lavage

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

Turnaround: 5 working days

Report: Detected or not detected

Adenovirus Molecular Quantitative

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL EDTA blood

Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Plasma must be frozen by laboratory within 24 hours of sample collection.

Turnaround: 5 working days

Report: Detected or not detected

Adrenal Antibodies

Laboratory: Sample referred from Autoimmune Serology to 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 www.biomnis.ie 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 15 mins approx. CUH wards, CUMH, SI, SF, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days

Ref. Range: 4 - 45 U/L

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Albumin (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL in blood plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days
Ref. Range: 35 – 52 g/L (0-4days: 28-44 g/L)

Albumin (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 hour urine sample
Turnaround: 1 Day
Ref. Range: 0 – 30 mg/24 hr

Albumin: Creatinine Ratio (urine)

Laboratory: Clinical Biochemistry
Specimen: Spot urine
Turnaround: 1 Day
Ref. Range: < 2.5 mg/mmol M
< 3.5 mg/mmol F

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.
Turnaround: 1 Day
Ref. Range: Not normally detected
Concentrations of >180mg/dL are associated with disorientation. \levels >350mg/dL are usually required to produce coma. Fatal poisoning is associated with levels >450mg/dL

Aldosterone/Renin ratio

Laboratory: Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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 15mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
GP or OPD- Results posted within 4 days
Ref. Range: M:48 – 135 U/L (Adult) F: 34 – 104 U/L (Adult)
Contact CUH Biochemistry Laboratory for Paediatric Age Related Range.

Alpha-1-Antitrypsin

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days

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Ref. Range: 1.1– 2.1 g/L (Adult). Contact Biochemistry lab for paediatric age-related ranges

Alpha-1-Antitrypsin Phenotyping

Laboratory: Sample referred from Clinical Biochemistry to Pulmonary Research Division, Royal College of Surgeons in Ireland, Education and Research centre, Beaumont Hospital, Dublin 9.

Specimen: 0.2 mL serum

Turnaround: 2-3 weeks

Ref. Range: Contact Biochemistry

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: 0.9– 8.8 µg/L

Amikacin / Amikin

Refer to Antibiotic Assays

Amoeba Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Positive or negative

Ammonia

Laboratory: Clinical Biochemistry

Specimen: Blood sample in Li Hep or EDTA bottle

Comment: Please inform laboratory in advance. Fill specimen to the top and transport on ICE.
Haemolysis invalidates result.

Turnaround: Once the lab is contacted in advance, results could be ready in approx. 1 hour 15mins

Ref. Range: Adult: 10 – 47 µmol/L (Adult).
Neonatal: Up to 100 µmol/L. Pre-term and /or sick babies may have concentrations up to 200 µmol/L. Lower concentrations after 1month.

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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 15mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.

Ref. Range: 30 – 120 U/L

Amylase (Urinary)

Laboratory: Clinical Biochemistry

Specimen: Spot or 24 hour urine sample

Turnaround: 1 Day

Ref. Range: 0 – 1200 IU/24 Hr

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: Molecular Genetics in Biochemistry referred to National Centre for Medical Genetics.
NCMG request form is available on website, www.genetics.ie/molecular

Specimen: Infants: 1ml EDTA blood
Adults 3-5ml EDTA blood

Turnaround: 6 weeks

Report: Sent to referring clinician by NCMG and copy of report filed in pathology

Angiotensin converting enzyme (ACE)

Laboratory: Clinical Biochemistry

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

Turnaround: 4 Days

Ref. Range: 0 – 45 IU/L

Antenatal Screen

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Comment: Screen includes Rubella IgG, Hepatitis B Surface antigen, HIV Ag/Ab, Syphilis antibody, Varicella-zoster virus (VZV) IgG

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

Report: Positive or negative (IU/mL for Rubella IgG)

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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
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).

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	
Antibiotic - multiple dosage		Trough	Peak (1 hour post)
Gentamicin	x3 daily dosage	<2 mg/L	5-12 mg/L
Amikacin	x3 daily dosage	<5 mg/L	15-30 mg/L
Tobramycin	x3 daily dosage	<2 mg/L	5-12 mg/L
Vancomycin	BD	10-20 mg/L	20-40 mg/L

Anti Cardiolipin Antibodies

Laboratory: Haematology
Specimen: Blood 4mL Red Vacuette® (clotted blood)

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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 investigations.

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 Immucap 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

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 Immucap 250 analyser.

For stat PR3 and MPO testing please contact lab directly.

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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: 1 – 2 months

Ref. Range: Not applicable

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-Streptolysin-O (ASO) Titre

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Turnaround: 36 hours

Report: Titre provided

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

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

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)

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Comment: Haemolysis invalidates result

Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.

Ref. Range: 6 – 42 U/L

Aspergillus Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Quantitative result with an interpretative comment

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 / Fowl

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Quantitative result with an interpretative comment

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.

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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 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: Approx. one month
 Ref. Range: See report or contact Cancer Molecular Diagnostics, St James Hospital, Dublin

Bence - Jones protein

Laboratory: Clinical Biochemistry (Immunology Laboratory)
 Specimen: 20 mL urine
 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 2 Glycoprotein 1

Laboratory: Haematology
 Specimen: Blood 3mL red Vacuette® (serum)
 Comment: Forms part of the Lupus and/or Thrombophilia Screen. This assay is only available when requested as part of Thrombophilia investigations.
 Turnaround: 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 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 www.biomnis.ie for up to date referral test information

Bicarbonate (Plasma)

Laboratory: Clinical Biochemistry
 Specimen: Fresh 4.0 mL blood in plain tube (clotted sample)

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Turnaround: A/E or urgent sample: - 1 hour 15 mins approx.
CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.

Ref. Range: 22 – 26 mmol/L.

Bile Acids

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 2 days
Ref. Range: 0- 10 µmol/L

Bilirubin- Direct

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 1 – 10 µmol/L (adult) 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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 2 – 20 µmol/L (adult) 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). Serum/plasma must be frozen by laboratory within 24 hours of collection.
Turnaround: 5 working days
Report: BK viral load

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Blood Culture

Laboratory:	Microbiology (Main laboratory)				
Specimen:	<p>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.</p> <table> <tr> <td>Adults:</td><td>Preferably, a volume of 8-10mL of specimen per vial.</td></tr> <tr> <td>Children /neonates:</td><td>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.</td></tr> </table> <p>Note: Do not exceed the manufacturer's recommended maximum volume for each bottle.</p>	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.
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.				
Comment:	<p>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.</p> <p>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.</p> <p>For neonates consider the use of a single aerobic paediatric vial appropriate for small volumes of blood.</p> <p>If necrotising enterocolitis is suspected and sufficient blood is obtained, inoculate a paediatric and a lytic/anaerobic bottle.</p> <p>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 typhoid fever and brucella species.</p>				

Blood cultures should be transported to the laboratory as soon as possible 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. 7 days for bone marrow or 10 days if endocarditis is suspected.
Report:	<p>A provisional report is issued at 48 hours and a final report at 5 days if the blood culture is negative.</p> <p>Positive results are phoned as soon as available to the requesting area or team.</p>

Blood Gases (pH, pCO₂, pO₂, Actual Bicarbonate, Base Excess, O₂ Saturation)

Laboratory:	Clinical Biochemistry
Specimen:	Li Hep syringe
Comment:	If delay between sample being taken and arrival in CUH Biochemistry lab is to be greater than 15 minutes, sample must be sent on ice.
Turnaround:	15 Minutes

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Ref. Range:	PH	7.36– 7.44	Actual Bicarb	22 – 26 mmol/L
	PCO ₂	4.5 – 6.1 kPa	Base Excess	-2 - +2.5 mmol/L
	PO ₂	11.3 – 14.0 kPa		

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 2 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 Requisition Form LF-C-BTR-PROREQ. Crossmatch is an INAB accredited test.
Turnaround:	3 Hours. (Note: The presence of irregular antibodies, or the need for certain 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.
Ref. Range:	Not Applicable

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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 up to 3 weeks. Blood may be crossmatched subsequently on that sample on request.
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 Component Prescription and Transfusion Record (Report of a suspected Transfusion Reaction).

Turnaround: 4 Hours.

Ref. Range: Not applicable

Bone Marrow Examination (Haematology)

Laboratory: Haematology

Specimen: Fresh bone marrow air-dried films.
Specimen must be labelled 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: N/A

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***Bordetella pertussis* Antibodies**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Test performed by reference laboratory (Respiratory and Vaccince Preventable Bacteria Reference Unit (RVPBRU), London)
Turnaround: 2 weeks
Report: Quantitative value with interpretative comment. In the absence of recent vaccination, values greater than 100 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: 6 -8 weeks

Brain tumour – molecular analysis for 1p19q and MGMT methylation status

Laboratory: Neuropathology
Specimen: Brain tumour biopsy
Comment: This investigation is selected by the Neuropathologist. Processed biopsies are sent to Molecular Laboratory, Beaumont Hospital, Dublin 9.
Turnaround: 2-3 weeks

Breast Needle Core Biopsy Calcified and Non-Calcified

Laboratory: Histopathology (Diagnostic Laboratory)
Specimen: Formalin fixed tissue. Immediately place in Buffered Formal Saline and please state date and time specimen taken.

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Comment: 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 are placed in yellow mesh cassettes which are subsequently placed in a correctly labelled specimen container containing buffered formalin.

Calcified cores are placed in orange mesh biopsy cassettes which are subsequently placed in a correctly labelled specimen container containing buffered formalin.

Turnaround: 80% cases in 2-3 days

Bronchial/Nasal Brushings for PCD analysis

Laboratory: Histopathology (Electron Microscopy/ Renal)

Specimen: Bronchial and Nasal brushings

Comment: Contact the laboratory in advance on extension 21315, Bleep 379 or by e-mail to arrange collection of Glutaraldehyde Fixative.

Turnaround: 2 months

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: 3 weeks

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.

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C1 Esterase Inhibitor (Function)

Laboratory: Sample referred from Clinical Biochemistry to 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 www.biomnis.ie for up to date referral test information.

C1 Esterase Inhibitor (Total)

Laboratory; Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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: C3: 0.87-2.0 g/L C4: 0.19 – 0.52 g/L

CD3 / CD4/ CD8 / CD19 / CD56 Counts

Laboratory: Haematology
Specimen: Blood 3mL, 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 / μ L			CD4 Absolute Counts / μ L			CD8 Absolute Counts / μ L		
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 / μ L			CD 56 Absolute Counts / μ L		
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

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C Peptide

Laboratory: Clinical Biochemistry
 Specimen: 2.0 mL blood in a plain tube (clotted sample) at 4⁰ 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: 0 – 35 kU/L

CA 15-3

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood a plain tube (clotted sample)

 Turnaround: 4 days
 Ref. Range: 0 – 31 kU/L

CA 19-9

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood in plain tube (clotted sample)
 Turnaround: 4 Days
 Ref. Range: < 37 kU/L

Calcitonin

Laboratory: Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Ref. Range: 2.10 – 2.65 mmol/L (Adults) 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: 2.5 – 7.5 mmol/24hours

Calcium: Creatinine Clearance

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

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Calcium Sensing Receptor (CASR) Mutation analysis

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to Oxford NHS (via NCMG)

Specimen: 3-5ml EDTA blood

Comment: Use NCMG request form with consent available from www.genetics.ie. Contact ext 22531 for Oxford Proforma.
Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.

Turnaround: 8 weeks

Report: Sent to referring clinician and copy filed in pathology

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

Ref. Range: Therapeutic Range 4 – 12 mg/L Alert range >25mg/L

Carbapenamase Producing *Enterobacteriaceae*

Laboratory: Microbiology (Main laboratory)

Specimen: Rectal swabs, placed in charcoal containing transport media. **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. 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

Carboxyhaemoglobin

Laboratory: Clinical Biochemistry

Specimen: Li Hep syringe

Turnaround: 1 hour 15 mins

Ref. Range: < 1.5% Smokers: < 5% Heavy smokers: < 9%

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Cardiothoracic specimens

Laboratory: Histopathology
Specimen: Cardiothoracic
Comment: All cardiothoracic specimens must be delivered directly to Histopathology laboratory reception without delay.
Optimal fixation in Buffered Formalin Saline (BFS) ensures preservation of antigenicity. 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.
Tissue should not be removed from resection specimens, for research purposes or otherwise, without prior consultation with a Pathologist.
Where specimens are orientated by/with sutures, their designation should be clearly detailed on the accompanying request Form.

Turnaround: Small biopsy - 80% of cases by day 5
Non-biopsy cancer resection - 80% of cases by day 7
Non-biopsy other - 80% of cases by day 7

Ref. Range: Non-applicable

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

Laboratory: Sample referred to from Clinical Biochemistry to Beaumont hospital
Specimen: 24-hour urine sample collected into a container that has acid added. 24 hr urine containers are available from stores; acid is added in the Biochemistry lab.
Comment: Diet must NOT include bananas, chocolate, tomatoes, citrus fruits, walnuts, pineapple, plums, dried fruit, tea or coffee in the 48 hours before collection
Turnaround: 3 Weeks
Ref. Range: Contact CUH Biochemistry Laboratory

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.

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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: 0 – 5 ug/L

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) - Culture and Microscopy

Laboratory: Microbiology (Main laboratory)
Specimen: Ideally, the laboratory should receive a minimum volume of 1mL in a universal container. 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.

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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)

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.

The following WBCs/cmm are normal:

Neonates	0-30	5yr to puberty	0-10
1-4 yr old	0-20	Adults	0-5

A Gram stain is performed on all CSF specimens with a white cell count above the normal range as indicated above.

A differential leucocyte 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.

For haemorrhagic CSFs a WBC: RBC ratio of 1:500 to 1:1000 is generally regarded as not indicative of infection. .

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; the CSF MUST be double-bagged and marked with a biohazard label.

Turnaround: 2 days

Ref. Range: Not applicable

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

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Cerebrospinal Fluid (CSF) – Immunophenotyping - primary CNS lymphoma or CNS involvement by Leukaemia/ lymphoma

Laboratory:	Referred from Haematology Dept. to Haem. St. James hospital, Dublin 8
Specimen:	RPMI-heparin medium is stored in the haematology Dunmanway day unit, once the CSF is added the samples are to be sent directly to the haematology laboratory.
Comment:	Test available Monday- Friday during routine working hours 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 RPMI-heparin. CSF samples are extremely labile and samples not received in RPMI-heparin and will not be processed if greater than 1 hour old irrespective of Microbiology or Cytology cell counts
Turnaround:	3 - 6 days
Ref. Range:	See referral laboratory report

Cerebrospinal Fluid (CSF) – Oligoclonal bands

Laboratory:	Sample referred from Clinical Biochemistry to BIOMNIS Laboratories
Specimen:	0.5 mL CSF and 4.0 mL blood in plain tube (clotted sample)
Turnaround:	2 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:	200 – 400 mg/L

Cerebrospinal fluid (CSF) – 14-3-3 protein and S100 protein

Laboratory:	Neuropathology
Specimen:	2-3 mL clear CSF in a universal container, double-bagged and marked with a biohazard label. 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 sent to the UK CJD Surveillance Centre, Edinburgh, Scotland, approximately monthly. Turnaround Time for results is approximately 11 days from the time of dispatch to CJD Surveillance Unit. Specific request forms are provided by the CJD surveillance unit in Edinburgh and are available from the Neuropathology office (22520) and on Q-pulse. These incorporate the clinical information required to interpret the results and should accompany the CSF specimens.
Turnaround	Approx. 11 days from the time of dispatch to CJD Surveillance Unit. (Batched and sent approx monthly)

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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:	0.18-0.58 g/L

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:	Positive or negative

Chlamydia psittaci Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Performed by a reference laboratory (PHE South West Laboratory, Bristol)
Turnaround:	3 weeks
Report:	Quantitative result with an interpretative comment

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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.

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 95 – 107 mmol/L

Chloride (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 Hr sample
Turnaround: 1 Day
Ref. Range: 250 – 450 mmol/24 Hr

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: Total Cholesterol Target Values: <5.0 mmol/L

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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:	1 month
Ref. Range:	Contact Biochemistry (ext 22531)

Chromosome Analysis / Karyotype <5 years old

Laboratory:	Referred from Molecular Genetics Lab in Biochemistry to NCMG). Patients <5yr are referred to NCMG. Referrals Mon-Thurs only.
Specimen:	DO NOT refrigerate specimens. Infants: 1mL Lithium Heparin blood
Comment:	Copy of NCMG request form with consent available at www.genetics.ie .
Turnaround:	See NCMG website (TAT depends on priority)
Report:	Sent to referring clinician and copy of report filed in pathology

Chromosome Analysis / Karyotype >5 years old

Laboratory:	Referred from Molecular Genetics Lab in Biochemistry via Med lab Path to the Doctor's Lab, London (TDL). Samples sent Mon-Thurs or by special arrangement before 9.30am on Fridays (contact ex 22531 to discuss).
Specimen:	DO NOT refrigerate specimens. Adults: 3mL Lithium Heparin blood Infants: 1mL Lithium Heparin blood
Comment:	Please use consent form available at http://www.sonichealthcare.ie/test-information/request-forms.aspx Please note: invoices are issued directly to referring clinician.
Turnaround:	5-15 days
Report:	Report sent to referring clinician and copy of report filed in pathology

Citrate (Urinary)

Laboratory:	Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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 Pattern of immunofluorescence. If CLIFT assay is positive a further quantitative Anti dsDNA Immunoassay is carried out.
Turnaround:	72 Hours
Ref. Range:	Not applicable

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***Clostridium difficile* Testing**

Laboratory:	Microbiology (Category 3 Laboratory)
Specimen:	Fresh faeces specimen. 1-2g (1-2mL) is sufficient.
Comment:	<p>A molecular diagnostic assay is used for the direct qualitative detection of <i>Clostridium difficile</i> toxin B gene in human faeces samples.</p> <p>Test performed Monday to Friday.</p> <p>Testing on individuals < 2 years should be restricted but exceptions can be made where indicated by the Microbiology Medical team.</p> <p>Requests for <i>C. difficile</i> 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.</p> <p>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.</p> <p>Test of cure is not recommended.</p> <p>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.</p> <p>Samples greater than 3 days old on receipt in the laboratory are unsuitable for testing.</p>
Turnaround:	<p>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.</p> <p>Positive reports are telephoned when available to the requesting area.</p>
Report:	<p><i>C. difficile</i> toxin PCR target NOT detected/TARGET DETECTED</p> <p>A Target Not Detected result does not automatically exclude infection from <i>C. difficile</i> as the level of DNA present may be lower than the limit of detection of the assay.</p>

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

Laboratory:	Referred from Haematology Dept to Royal Marsden Hospital UK
Specimen:	<p>Blood 3 mL purple Vacuette (EDTA) 5 -10 mLs required and 3 mL green Vacuette (Lithium Heparin)</p> <p>Available Mon – Thurs, sample to reach Haematology Lab by 12 noon on day of sampling.</p>
Comment:	Prognostic markers for CLL
Turnaround:	3 - 4 weeks
Report:	See referral laboratory report

Coagulation Factor VIII Inhibitors – Quantitation Assay

Laboratory:	Haematology
Specimen:	<p>Blood 3mL x2, blue Vacuette® (sodium citrate 3.2%).</p> <p>Specimens that are haemolysed, underfilled or overfilled cannot be analysed check coagulation sample bottles are not expired to ensure correct filling.</p>
Comment:	<p>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.</p> <p>Samples must be received within 4 hours</p>
Turnaround:	2 – 4 weeks
Ref. Range:	<p>Negative</p> <p>Weak Factor Inhibitor: </= 10 BU/mL.</p> <p>Strong Factor Inhibitor: > 10 BU/mL.</p>

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Coagulation Factor Inhibitor Screen

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: Demonstrates the inhibitory effect of Coagulation Factor antibodies. Test available Monday to Friday, during routine working hours. See also Coagulation factor VIII Inhibitors – Quantitation Assay.
Samples must be received within 4 hours
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 (Mycology Reference Centre, Leeds)
Turnaround: 3 weeks
Report: Positive or negative

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.

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Connexin (DFNB1) Mutation analysis

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to Leeds NHS (via NCMG)

Specimen: 3-5ml EDTA

Comment: Use NCMG request form with consent available from www.genetics.ie
Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.

Turnaround: 40 days

Report: Sent to referring clinician and copy filed in pathology

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 $\geq 50/\text{cmm}$ a Gram stain and white cell differential is performed.

Copper

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain metal-free tube (Lithium Heparin)

Turnaround: 1 week

Ref. Range: 11 – 24 $\mu\text{mol/L}$

Copper (Urinary)

Laboratory: Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford.

Specimen: 24 hr urine sample

Comment: N.B. Use designated 24 hr urine 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:

- Cortisol AM: **101-536 nmol/L**
- Cortisol PM: **79-478 nmol/L**

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: 100 - 379 nmol/24 Hr

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***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: 3 weeks
 Report: Positive or negative

Creatine Kinase (CK)

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood in plain tube (clotted sample)
 Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Ref. Range: Male: 40 – 180 U/L Female: 20 – 140 U/L

Creatinine (Blood)

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood in plain tube (clotted sample)
 Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Comment: Estimated Glomerular filtration rate (eGFR) is available on request. Method adjusted 4-variable MDRD formula is used for calculation.
 Ref. Range: Males (adult): 64 – 104 µmol/L
 Females (adult): 49 – 90 µmol/L
 Paediatric range available from laboratory

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: Male: 8000 – 17700 µmol/24 Hr Female: 7000 – 154000 µmmol/24 Hr

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: 60 – 120 mls/min

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
 Ref. Range: 0 – 10 mg/L

Cryoglobulin

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

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Cryptococcal Antigen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood, CSF (0.3mL minimum)
Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround: 3 weeks
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)
Comment: Molecular tests for Enterovirus, Herpes Simplex virus (HSV1/2), Varicella-zoster virus (VZV). For patients <3 years of age, Human Herpes virus 6 (HHV-6) and Parechovirus also included in screen.
Testing performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).
Turnaround: 5 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: 1-2 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.

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Cystic Fibrosis (CF)

Laboratory: Specimens referred from Molecular Genetics Lab in Biochemistry to NCMG.
Specimen: Adults: 3-5 ml EDTA blood,
Infants: 1ml EDTA blood
Comment: NCMG request form available from www.genetics.ie.
Patient Information Request (PIR) form for carrier status in CF families
available from www.genetics.ie
Turnaround: 6-8 weeks
Report: Sent to referring clinician by NCMG and copy of report filed in pathology

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 preformed 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: Tests are performed routinely Monday to Friday during routine working hours.

Turnaround: Non gynaecological cytology – FNA – 80% of cases by day 5
Non gynaecological cytology – Exfoliative – 80% of cases by day 5

A verbal report may be available within 2 hours for clinically urgent samples by prior communication with the reporting Consultant.

Ref. Range: Not applicable.

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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: Positive or negative

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). Plasma must be frozen by laboratory within 24 hours of sample collection.
 Turnaround: 5 working days
 Report: Detected or not detected

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: 2 weeks
 Report: Positive or negative

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: 3 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

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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: Daily, urgent samples prioritised
Ref. Range: Therapeutic Range 0.5-1.0µg/L Toxic >2.4µg/L

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 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 (EM 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: 6-7 days

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.

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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).

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 (PHE National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 3 weeks

Report: Positive or negative

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.
Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.

Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day

Report: Detected or not detected

EGFR, ALK, BRAF, KRAS & NRAS

Laboratory: Molecular Pathology: Molecular testing in the pathology laboratory CUH is performed on request from Consultant Histopathologists on FFPE samples from patients with Lung cancer, colon cancer and melanoma. The current repertoire of PCR tests includes, EGFR with reflex ALK, BRAF, KRAS & NRAS.

Specimen: Histopathology Tissue Block

Turnaround: 5-10 working days

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Electron Microscopy

Laboratory: Histopathology (EM Dept.)
Specimen: Fresh unfixed tissue and brushings (For renal biopsies see Renal Biopsy)
Comment: Specimens are accepted Mon – Fri 8am to 3:30pm
Please contact the laboratory in advance of the procedure at Ext. 21315 or bleep 379, 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.

Turnaround: 4-6 weeks

EMA (Endomysial Antibodies)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Immunofluorescence 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: 3 weeks
Report: See referral laboratory report

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.

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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), 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 ECHO virus and Cocksackie virus. A throat swab is requested for CSF samples positive for Enterovirus RNA so that characterisation can be carried out.

Turnaround: 5 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

Comment: EBV IgM (VCA) performed in-house.

EBV IgG (VCA and NA) testing is performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).

Turnaround: 36 hours for EBV IgM, 5 working days for EBV IgG

Report: Positive or negative

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). Plasma must be frozen by laboratory within 24 hours of sample collection.

Turnaround: 5 working days

Report: Detected or not detected

Erythropoietin

Laboratory: Sample referred from Clinical Biochemistry to 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 www.biomnis.ie for up to date referral test information.

ESR Erythrocyte Sedimentation Rate

Laboratory: Haematology

Specimen: Fresh blood 3mL purple Vacuette (EDTA), specimen must be <24 hours old from the time of phlebotomy. Minimum volume of sample required for ESR is 1.4 mL.

Comment: ESR Measurement is a non-specific test of inflammation and tissue damage. Test available Mon to Fri during routine working hours.

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

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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

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	1.08	0.70 – 1.46

Factor V

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: 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

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

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Factor V Leiden Mutation (G1691A)

Laboratory: Haematology Molecular Genetics
Specimen: Blood 3mL 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.
Turnaround: 6 - 8 weeks
Ref. Range: Normal / Heterozygous / Homozygous, see Laboratory report

Factor VII

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: 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
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

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: 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
Turnaround: Emergency specimens < 4hours;
Routine specimens 2 weeks.
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

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)

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

Turnaround: 4 - 7 weeks

Ref. Range: Adults (>18 years) 0.55 – 1.77 IU/ml
Refer to referring laboratory's report

Factor IX

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: 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

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

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: 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

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

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

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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

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: 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

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

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: 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

Turnaround: 3 weeks

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

Faecal Elastase

Laboratory: Sample referred from Clinical Biochemistry to Dr Jonathan Berg, Clinical Chemistry Dept., City Hospital, Dudley Road, Birmingham, West Midlands, B18 7QH Tel 0044215075353

Specimen: Minimum 5g stool

Turnaround: Stable at room temperature for up to 1 week and for 1 month, stored at 4°C

Ref. Range: See report form

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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:** Negative: within 24 hours if received between Monday and Thursday; specimens received on Friday after 11:00am should be reported before 5 pm on the following Monday.
Positive: *Campylobacter* detection should be reported on the day of testing; *Cryptosporidium parvum/hominis* should be reported ≤ 36 hours; salmonella identification should be confirmed within 72 hours of processing; shigella identification should be confirmed within 72 hours if present; For verotoxin, a positive result should be reported within 24 hours if received between Monday and Thursday; specimens received on Friday should be reported before 5 pm on the following Monday.
Clinically significant isolates are telephoned when available.
- Report:** Report presence of specific pathogen and absence of other pathogens (Target Not Detected or Target Detected). Faeces is 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 cholerae* 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 *Clostridium difficile* testing, *Cryptosporidium* Sp. Parasitology and Rotavirus /Adenovirus antigens.

Fallopian Tube Aspirate / Tubo-ovarian Fluid

See Sterile Body Fluid – Microscopy and Culture.

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Fanconi's Anaemia

Laboratory: Referred from Biochemistry to Bristol Genetics Lab
Specimen: 5ml Lithium Heparin blood/bone marrow in Lithium Heparin
Paediatrics – at least 1ml lithium heparin (preferably 2ml)
Comment: 24hrs notice required to facilitate courier arrangements (Contact ext 22531).
Request form available at www.nbt.nhs.uk/genetics
Turnaround: 28 days

Farmers Lung Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround: 3 weeks
Report: Positive or negative

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.
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 17 – 320 ng/ml

Fertility Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Screen includes 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 and anti-HCV (external confirmatory testing required).
Report: Positive or negative

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.

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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

Please note: 1 month

Filaria Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Positive or negative

Fluorescence In-Situ Hybridisation (FISH) for Microdeletions Syndromes (eg. Di George, Williams)

Laboratory: Specimen referred from Molecular Genetics Lab in Biochemistry to NCMG.

Specimen: Adults: 2ml Lithium Heparin blood.
Infants: 1ml min Lithium Heparin blood)
DO NOT refrigerate specimens.

Comment: NCMG request form available from www.genetics.ie

Turnaround: See NCMG website

Report: Sent to referring clinician from NCMG and copy of report filed in pathology

Flow Cytometry

Laboratory: Haematology

Specimen: Fresh Blood or Bone Marrow – 3mL, purple Vacuette (EDTA). Samples may be refrigerated overnight. Optimal sample age less than 48 hours.

Comment: 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.

Turnaround: Routine specimens: 72 hours
Urgent specimens: 24 hours

Ref. Not applicable

Range:

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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

Flecainide

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: 3 weeks
Therapeutic Range: 100-600µg/L

Foetal Maternal Haemorrhage by Flow Cytometry > 2.5mls bleed

Laboratory: Referred by Haematology to the Rotunda Hospital, Parnell St, Dublin 1
Specimen: EDTA specimen
Comment: Bleeds > 2.5 mls are referred
Turnaround: 1- 3 days

Foetal Sex Typing

Laboratory: Referred from Biochemistry 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
IBGRL request form (FM4739) to be completed by referring clinician
Turnaround: 5 working days from receipt of specimen in Bristol

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

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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. 3.1 – 20 ng /mL
Range:

Formalin fixed tissue

Laboratory: Histopathology
Specimen: Tissues for Histopathology excluding those listed below (See separate entries):
Breast Needle Core Biopsy calcified and non-calcified
Neck Dissection Specimens
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.
Turnaround: Small biopsy - 80% of cases by day 5
Non-biopsy cancer resection - 80% of cases by day 7
Non-biopsy other - 80% of cases by day 7
Cancer specimens as per NCCP guidelines.
Ref. Not applicable
Range:

Fragile X Syndrome (FRAX)

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to NCMG.
Specimen: Infant: 1ml EDTA & 1ml Lithium Heparin bloods
Adults: 3-5mls EDTA & 2mls Lithium Heparin bloods
Comment: Both blood types required as both DNA analysis and karyotype performed.
NCMG request form available from website, www.genetics.ie
Turnaround: Up to 6 months
Report: Sent to referring clinician and copy of report filed in pathology

Francisella tularensis Antibodies

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

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Comment: Performed by a reference laboratory (Rare & Imported Pathogens Laboratory (RIPL), Porton Down)

Turnaround: 3 weeks

Report: Positive or negative

Free T4 (Thyroxine)

Laboratory: Clinical Biochemistry

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

Turnaround: 4 Days

Ref. Range: 9.0 – 19.1 pmol/L

Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Free T3 (Triiodothyronine)

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL blood in plain tube

Turnaround: 4 Days

Ref. Range: 2.6 - 5.7 pmol/L

Range: Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Frozen Sections (Intraoperative Consultation), 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.

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Frozen Sections – Urgent

Laboratory: Histopathology (Diagnostic Laboratory)
Specimen: Fresh tissue
Comment: The Frozen Section service is available **Mon – Fri 8am to 5:30pm**
Outside of these hours if a frozen section is anticipated, the pathologist on call must be contacted through the hospital switchboard for discussion of the case. *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.

Transportation
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. 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:	Follicular phase: 3.0 – 8.1 IU/L	Post menopause: 26.7 – 133.4 IU/L
	Ovulation: 2.6 - 6.7 IU/L	Male: 1.0 – 12 IU/L
	Luteal phase: 1.4 – 5.5 IU/L	

Full Blood Count including automated WBC Differential, Blood Films for Manual White Cell Differentials, Slide Platelets and Red Cell Morphology

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, leukaemias, 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 clicmician.

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

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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: Reference ranges for 12 years and older

Parameter	Range		Units
	Male	Female	
Haemoglobin	13.0 – 17.0	11.7 – 15.9	g/dl
RBC	4.2 – 5.6	3.9 – 5.3	10 ¹² /l
HCT	0.38 – 0.49	0.35 – 0.46	l/l
MCV	80-96		fl
MCH	27-33		pg
MCHC	32-36		g/dl
RDW	11-15 (not reported)		
Platelet	140-440		10 ⁹ /l
WBC	4.4-11.3		10 ⁹ /l
Neutrophils	1.4-6.6		10 ⁹ /l
Lymphocytes	0.9-3.2		10 ⁹ /l
Monocytes	0.15-1.3		10 ⁹ /l
Eosinophils	0.04-0.4		10 ⁹ /l
Basophils	0-0.1		10 ⁹ /l
	Male	Female	
ESR	0-10	0-20	mm/hr
Retic abs	23-93		10 ⁹ /l
NRBC	0		/100 WBC

PTO –

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Ref. Range: Age-Related Reference Ranges

Test	Range				
	1 day	2 to 14 days	15 days to 2 months	2 months and 1 day to 1 yr	1 year and 1 day to 12 yrs
Hb	14.9-23.7	13.0-20.0	9.4-13.0	10.1-13.0	11.1-14.7
RBC	3.7-6.5	3.9-5.9	3.1-4.3	3.9-5.1	3.9-5.2
HCT	0.47-0.75	0.41-0.65	0.28-0.42	0.30-0.38	0.32-0.43
MCV	100-125	88-110	84-98	70-82	76-95
MCH	31-34	31-34	30-36	23-31	27-32
MCHC	30-36	29-37	29-36	32-36	31-37
PLT	150-450	170-500	210-650	200-550	170-450
WBC	10-26	6-21	5-15	6.0-16.0	4.5-14.5
NEUT	2.7-14.4	1.5-5.4	0.7-4.8	1.0-8.0	1.5-8.0
LYMP	2.0-7.3	2.8-9.1	3.3-10.3	3.4-10.5	1.5-5.0
MONO	0.12-1.7	0.12-1.7	0.12-1.7	0.12-1.7	0.12-1.7
EOS	0-0.85	0-0.85	0.05-0.9	0.05-0.9	0.05-1.0
BASO	0.0-0.12	0.0-0.12	0.0-0.12	0.0-0.12	0.0-0.12
RETIC	110-450	10-80	30-200	30-130	30-130

Fungal Microscopy and Culture

See Mycology

GATA Mutational analysis

Laboratory: Referred from Haematology to Weatherall MRC Molecular Haematology Unit
Specimen: 3 mL EDTA
Comment: By arrangement only with laboratory
Turnaround: 2 – 3 weeks
Ref. Range: Not Applicable

G6PD Assay

Laboratory: Haematology
May be referred if Reticulocyte count is $>150 \times 10^9 /L$ to 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 $>150 \times 10^9 /L$
Turnaround: 1 week
Ref. Range: 4.6 – 13.5 U/g Hb. Note: Values for new-borns may range somewhat higher

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 assayed using a quantitative method. 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 $>150 \times 10^9 /L$
Turnaround: 1 week
Ref. Range: Normal/Decreased

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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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 0-55 U/L (Males) 0-38 U/L (Females). Contact laboratory for Paediatric ranges.

Ganglioside Antibodies

Laboratory: Sample referred from Autoimmune Serology to Claymon 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 www.claymon.com 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 Dept. of Pathology, Ninewells Hospital
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

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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 gonococcal 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 - TFE3/TFEB immuno + Renal tumour Cytogenetics

Laboratory: Specimen referred from Histopathology to Dept. of Pathology, Ninewells Hospital

Specimen: Histopathology Tissue block

Turnaround: 4 weeks

Gentamicin / Gentacin

Refer to Antibiotic Assays

Glucocorticoid Remedical Aldosteronism (GRA)

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to Addenbrookes NHS (via NCMG)

Specimen: 3-5ml EDTA blood

Comment: Use NCMG request form, available at www.genetics.ie

Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.

Turnaround: 2 weeks

Report: Sent to referring clinician and copy filed in pathology

Glucose

Laboratory: Clinical Biochemistry

Specimen: 4.0 mL Sodium fluoride EDTA

Comment: Grey-capped specimen tube

Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.

GP or OPD- Results posted within 4 days.

Ref. Range: WHO Guidelines. See report form

Glucose (Urinary)

Laboratory: Clinical Biochemistry or ward / GP surgery

Specimen: Fresh spot urine sample

Comment: Measured using dipstick. Aged sample invalidates result.

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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. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.

Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day

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

Laboratory: Sample referred from Clinical Biochemistry to SAS Laboratory, Charing Cross Hospital

Specimen: Blood, 10mL fasting in EDTA bottle sent to the laboratory on ice.

Comment: Consultant request only

Turnaround: 3 weeks

Ref. Range: See report form.

Haemochromatosis

Laboratory: Performed in the Molecular Genetics lab in Biochemistry

Specimen: 3.0 mL EDTA blood

Please see investigation guidelines and specific request form on CUH website, www.cuh.hse.ie

Turnaround: 4-6 Weeks

Report: Sent to referring clinician. Restricted access to genetic reports on laboratory database.

Contact Biochemistry ext 22531/22361 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: 1 month but may vary

Ref. Range: See referral laboratory report

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Haemoglobin HbA1c Glycosylated Haemoglobin

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA) (for Haemoglobin A1C a separate sample to the FBC sample is required) Paediatric EDTA containers available from laboratory, 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
Turnaround:	24 – 48 hours
Ref. Range:	20 - 42 mmol/mol (IFCC)

Haemoglobin A₂ Electrophoresis

Laboratory:	Haematology
Specimen:	Blood 3mL purple Vacuette® (EDTA)
Comment:	Haemoglobin A ₂ concentration is useful for the diagnosis of the α 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 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 emergency 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

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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
EDTA sample: minimum 2 mL blood
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 but may vary depending on complexity of analysis

Ref. Range: See report form or contact National Haemoglobin Reference 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 consultant to Oxford University Hospitals NHS JR320 tel 01865-220336

Specimen: 3 ml EDTA, minimum x 2 EDTA, 6 – 20 mls

Comment: By arrangement only with Haematology

Turnaround: 1 – 2 months

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: 3 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.
Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.

Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day

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: Positive or negative

Haptoglobin

Laboratory: Clinical Biochemistry

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

Turnaround: 4 Days

Ref. Range: 0.44-2.15 g/L

HCG +â

Laboratory: Clinical Biochemistry

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

Turnaround: 1 Day

Ref. Range: 0 – 5 IU/L

***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 loses 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 Vacurette® (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.
Positive specimens are referred for ELISA testing to Haematology to National Coagulation Laboratory, St., James Hospital, Dublin 8

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Specimen: Two Blood 3mL blue Vacuette® (sodium citrate 3.2%) and Two Blood 4mL red top Vacuette® (or similar container for clotted blood) (Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).

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%202025th%20August%202015.pdf>

Turnaround: Screening Test: 4 hours
ELISA Test (referral laboratory): 4 weeks

Ref. Range: See report form or contact Haematology to St., James Hospital Dublin

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: Positive or negative

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: Positive or negative

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.
For an inoculation injury, ≥10mIU/mL is considered protective for that incident. For a completed course of vaccination ≥100mIU/mL is considered an adequate response and such patients do not require further boosting or testing. For further information, please discuss with the Microbiology medical team.

Anti-HBs Level	
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<10mIU/mL	Non responder. Exclude past infection or chronic carriage*. Repeat 3 dose course of hepatitis B vaccine (a different brand of vaccine may be considered). Double dosing should be considered. Recheck anti-HBs at 2-4 months post completion.
10-99mIU/mL	Poor responder. Immediate booster and retest at 2-4 months using 2 assays; if both are >10mIU/mL, this indicates an adequate response**.
≥100mIU/mL	Adequate response.

Source: National immunisation guidelines

*Check anti-HBc and HBsAg to exclude past infection or chronic carriage before beginning 2nd course vaccination.

**For those at high occupational risk of contracting hepatitis B, efforts should be made to achieve a response of greater than 100mIU/mL.

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: Positive or negative

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-HBsAg.
Turnaround: Routine: 36 hours. Urgent: within 2 hours of receipt.
Report: Positive or negative

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: Positive or negative

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 days
Report: Positive or negative

Hepatitis D Antibody (Total)

Laboratory: Microbiology (Infectious Diseases Serology)

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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: 10 working days

Report: Positive or negative

Hepatitis E IgG

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 10 working days

Report: Positive or negative

Hepatitis E IgM

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 10 working days

Report: Positive or negative

Hepatitis Screen

See Hepatitis B Surface Antigen and Hepatitis C Antibody

Hereditary Fever Syndromes (FMF, TRAPS)

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to National Amyloidosis Centre at UCL

Specimen: 3ml EDTA blood + 3ml Serum

Comment: Special request form available from ext 22531

Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.

Turnaround: 4-6 weeks

Report: Sent to referring clinician and copy filed in pathology

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: 5 working days

Report: Positive or negative

Herpes Simplex Virus 1/2 Molecular

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: Viral swab (Remel swabs unsuitable), CSF, nasopharyngeal aspirate, sputum, broncho-alveolar lavage

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

Turnaround: 5 working days

Report: Detected or not detected

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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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: Male: > 1.0 mmol/L Female: > 1.2 mmol/L
Target values apply to pts at low or moderate risk CVD

High Vaginal Swab (HVS)

Laboratory: Microbiology (Main laboratory)
Specimen: It is important to avoid vulval contamination of the swab. The posterior fornix, including any obvious candidal plaques should be swabbed. Low vaginal swabs are discouraged because the presence of high numbers of commensal flora makes them difficult to interpret (see Low Vaginal Swab for 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: Specimens are generally examined for the presence of Candida or Group B Streptococci.
Specimens will be processed for *Trichomonas vaginalis* and Bacterial Vaginosis (BV) only if a slide is received.
Please indicate on the request form if the specimen is post-operative /post delivery so that supplementary testing can be performed. Vaginal swabs are not recommended for gonococcal culture on adults; an endocervical specimen is more appropriate. A separate specimen using the specific swabs and transport medium should be collected for the detection of *C. trachomatis*.
Turnaround: Prelim: 24 hours; Final: 48-72 hours
Report: Microscopy (by request): 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.

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Histopathology Specimens

Laboratory: Histopathology

Specimen: See separate entries for:

- Breast needle core biopsy calcified and non-calcified.
- Direct Immunofluorescence – Skin/Oral mucosa
- Electron Microscopy
- Formalin fixed tissue
- Frozen Sections - Urgent
- Liver Biopsy for Copper/Iron Estimation
- Neck Dissection Specimens
- Renal Biopsy
- Cardiothoracic Specimens

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

Histone Antibodies

Laboratory: Sample referred from Autoimmune Serology to 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 www.biomnis.ie for up to date referral test information.

Histoplasma Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Positive or negative

HLA Antibody (Antibody to Human Leucocyte Antigen)

Laboratory: Blood Transfusion Laboratory

Specimen: 4 mL Clotted

Comment: Referred to: I.B.T.S., National Blood Centre, James's St., Dublin 8.
Complete the Blood Transfusion request form 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

Laboratory: Blood Transfusion Laboratory

Specimen: 3 x 4 ml EDTA purple cap (FBC) tube or 9 mL ACD yellow capped 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

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HLH Granule release assay (Haemophagocytic Lympho Histocytosis)

Laboratory:	Referred from Haematology to Great Ormond Street Hospital
Specimen:	EDTA x 5mls
Comment:	By arrangement only with laboratory
Turnaround:	7 days
Ref. Range:	Not applicable

Homocystine – Free and 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
Turnaround:	1 week
Ref. Range:	See report or contact Biochemistry Laboratory, Temple Street Hospital

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), Dublin)
Turnaround:	5 working days
Report:	Positive or negative

Human Herpes Virus 6 (HHV-6) Molecular

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood, 4mL EDTA blood, CSF
Comment:	Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround:	5 working days (additional time required for confirmation of reactive samples). Serum/plasma must be frozen by laboratory within 24 hours of sample collection.
Report:	Detected or not detected

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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: 15 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.
 Newly positive specimens are referred to the National Virus Reference Laboratory, University College Dublin, for confirmation. A repeat specimen is requested on all newly diagnosed positive patients.
 Turnaround: Negative samples: 36 hours
 Samples positive in house: 2 weeks (confirmation required)
 Report: Positive or negative

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

Hydroxyprogesterone (Alpha 17-Hydroxyprogesterone)

Laboratory: Sample referred from Clinical Biochemistry to Leeds General Infirmary
 Specimen: 2.0 mL blood in a plain tube (clotted sample)
 Comment: Consultant request only
 Turnaround: 3 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: 4 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 BIOMNIS Laboratories
 Specimen: 4.0 mL blood in a plain tube (clotted sample)

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Comment: Consultant request only

Turnaround: 3 weeks

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

Immunoglobulins / Electrophoresis

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

Ref. Range:	IgA:	0.8 – 2.8 g/L (15 – 45 Yrs)	For paediatric references, please contact laboratory.
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		0.8 – 4.0 g/L (> 45 Yrs)	
	IgG:	6.0 – 16.0 g/L	For paediatric references, please contact laboratory.

	IgM:	0.5 – 1.9 g/L (15 – 45 Yrs)	For paediatric references, please contact laboratory.
		0.5 – 2.0 g/L (>45 Yrs)	

Infectious Mononucleosis Screening test

Laboratory: Haematology

Specimen: EDTA specimen

Comment: This test is only performed if results of the Full Blood Count and/or manual differential suggests 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 B₁₂ to aid in the diagnosis of pernicious anaemia.
Free B12 levels of >444 ng/L can give false positive results.

Turnaround: 7 working days

Results: Negative / Indeterminate / Positive

Insulin

Laboratory: Clinical Biochemistry

Specimen: 2 mL blood in a plain tube (clotted sample)

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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 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 www.biomnis.ie 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 24 hours

Turnaround: 2 weeks

Ref. Range: Age and gender based. See report.

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 Acanthamoeba 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)

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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)

Comment: TORCH Screen includes *Toxoplasma gondii* IgM, Rubella IgM, CMV IgM and Parvovirus B19 IgM.

Turnaround: 36 hours.
Positive Toxoplasma IgM must be confirmed by reference laboratory – at least 3 weeks.

Report: Positive or negative

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: Male: 12.5-32.2 µmol/L Female: 10.7-32.2 µmol/L

JC Virus Molecular

Laboratory: Microbiology (Infectious Diseases Serology)

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

Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Serum/plasma must be frozen by laboratory within 24 hours of sample collection.

Turnaround: 5 working days

Report: Positive or negative

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 3mL, purple, Vacuette® (EDTA) or Bone Marrow in 10mLs in RPMI

Comment: Mutation analysis in MPD

Turnaround: 3 weeks

Ref. Range: See referral laboratory report

JAK2 Exon 12 mutation

Laboratory: Referred from Haematology Dept. Addenbrookes Hospital Cambridge, Mon to Thurs to reach haematology lab by 12 noon,
May also be sent to Oncology Cytogenetics, 5th Floor Tower Wing, Guy's Hospital, Great Maze Pond, London SE1 9RT

Specimen: Blood 3mL, purple, Vacuette® (EDTA) or Bone Marrow in 10mLs in RPMI

Comment:

Turnaround: 1 -2 months

Ref. Range: See referral laboratory report

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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)

Kleihauer Test for Foetal Cells

Laboratory: Haematology, and bleeds of >2.5mls in postnatal patients are referred to Rotunda Hospital for flow Cytometry
 Specimen: Blood 3mL purple Vacuette® (EDTA)
 Comment: Test available Monday to Friday, during routine working hours, and for emergency reasons at all other times.
 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.
 >2.5mls in postnatal patients are referred to Rotunda Hospital for flow Cytometry
 >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.

Lacrima (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, on ice
 Turnaround: 2 hours
 Ref. Range: 0.5 – 2.0 mmol/L

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Ref. Range: 220 – 450 U/L

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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

Lead

Laboratory: Sample referred from Clinical Biochemistry to BIOMNIS Laboratories
Specimen: 4.0 mL blood in Li Hep – whole blood
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site www.biomnis.ie for up to date referral test information.

Leishmania Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London)
Turnaround: 3 weeks
Report: Positive or negative

Leptospira IgM

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: EIA for Leptospira IgM. Test performed once per week.
Positive sera are sent to Rare & Imported Pathogens Laboratory (RIPL) in Porton Down for confirmation.
Turnaround: Negative samples: 8 days
Samples requiring confirmatory testing: 2-3 weeks
Report: Negative or positive

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:	Follicular phase:	1.8- 11.8 IU/L	Post menopause:	5.2 - 62 IU/L
	Midcycle:	7.6 – 89.1 IU/L	Male:	0.6 – 12 IU/L
	Luteal phase:	0.6 – 14.1 IU/L		

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

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Ref. Range: 0.5 – 0.8 mmol/L. Recommended range for maintenance therapy. Acute therapy may require levels up to 1.2 mmol/L

Liver Biopsy for Copper /Iron Estimation

Laboratory: Sample referred from Histopathology Laboratory to Trace Element Unit, Kings Healthcare Trust, London

Specimen: Liver Biopsy unfixed

Comment: Biopsy: Transfer from the needle without delay. At least 1 cm is required (or results may be invalid due to liver non-homogeneity). Clearly label a 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 moistened with distilled water (larger pieces do not need to be on filter paper). 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: 4-6 weeks

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.

Ref. Range: <3.0 mmol/L

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

Laboratory: Haematology

Specimen: Blood 3mL x 2, blue Vacuette® (sodium citrate 3.2%) and 1x 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.

Note: BCSH guidelines on thrombophilia testing must be adhered to.

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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 are also included as part of the screen if a clotted sample is received.

Samples without Clinical details WILL NOT be processed.

Turnaround: 3 – 4 weeks (Refer to the main Haematology Section on Coagulation).

Ref. Range: Strongly Positive, Moderately Positive, Weakly 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: 3 weeks

Report: Positive or negative

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 trachomatis and where the patient has the following clinical details:

- HIV positive
- A contact of a known LGV confirmed case
- Symptomatic of LGV

Turnaround: 7 working days

Report: Detected or not detected

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.

Ref. Range: 0.7 – 1.0 mmol/L

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Magnesium (Urinary)

Laboratory: Clinical Biochemistry
 Specimen: 24 Hr collection
 Turnaround: 1 Day
 Ref. Range: 3.0 – 5.0mmol/24 Hr
 Comment: In the presence of hypomagnesaemia, magnesium excretion > 1 mmol/24hours is suggestive of renal magnesium wasting and magnesium excretion
 < 0.5 mmol/24hours is suggestive of magnesium deficiency

Malaria 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. Positive samples are referred from Haematology PHE 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: 1 month (phoned report available within 3 working days)
 Ref. Range: Negative / Positive (with % Parasitaemia if *P. falciparum* or *P. knowlesi*).

Maturity Onset Diabetes of the Young (MODY)

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to Royal Devon & Exeter NHS(via NCMG)
 Specimen: 3-5ml EDTA blood
 Comment: Special request form available from
http://www.diabetesgenes.org/sites/default/files/mody_request_form_april_2013_0.doc
 Please note: invoices will be issued directly to the referring clinician.
 Turnaround: 8 weeks
 Report: Sent to referring clinician and copy filed in pathology

Measles IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
 Specimen: 4mL clotted blood
 Turnaround: 36 hours
 Report: Positive or negative

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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: 5 working days
 Report: Positive or negative

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). Serum must be frozen by laboratory within 24 hours of sample collection.
 Turnaround: 7 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 immediately
 Turnaround: 1 week
 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: 3 weeks

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Metanephrines (Urinary)

Laboratory: Sample referred from Clinical Biochemistry to Beaumont Hospital
Specimen: 24-hour urine sample collected into a container that has acid added. 24 hr urine containers are available from stores; acid is added in the Biochemistry lab.
Turnaround: 3 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)
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

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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 Folate (Leucovorin) rescue therapy.

Microarray (Array CGH) Analysis

Laboratory: Referred from Biochemistry to NCMG
Specimen: Specimen: Adults: 5ml EDTA blood
Infants: 2ml min EDTA blood
Comment: NCMG request form available on www.genetics.ie
Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.
Turnaround: 6-10 weeks
Report: Sent to referring clinician by NCMG and copy of report filed in pathology.

Microdeletion Syndromes (see FISH)

Microsatellite Instability

Laboratory: Specimen referred from Histopathology to Department of Histopathology, Beaumont, D9
Specimen: Tissue block
Turnaround: 20 days

Mineral Analysis (copper/iron)

Laboratory: Histopathology
Specimen: Liver biopsy unfixed
Comment: Place specimen on filter paper in dry universal container
Turnaround: 4-6 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 Molecular Genetics lab in Biochemistry to Newcastle Mitochondrial NCG via NCMG
Specimen: 3-5ml EDTA blood
Comment: Special request form available at http://www.mitochondrialnecg.nhs.uk/documents/NCG_Referral_Form.pdf
Please note: invoices will be issued directly to the referring clinician.
Turnaround: 8-10 weeks
Report: Sent to referring clinician and copy filed in pathology

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

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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 Biomnis Claymon

Specimen: 3.0 mL blood EDTA

Comment: When the body is deficient in methylenetetrahydrofolate 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

Turnaround: Approx. one month

Ref. Range: See referral laboratory report form

Mumps IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Turnaround: 36 hours

Report: Positive or negative

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: 5 working days

Report: Positive or negative

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: 7 working days

Report: Positive or negative

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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: Variable. For Mitochondrial enzyme analysis 8-14 weeks from time of dispatch; for mitochondrial Genetic Analysis several 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: 1 – 3 Months, but can vary depending on gene
Ref. Range: N/A

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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 Consultant Microbiologist. Collect early morning urine on 3 consecutive days. A minimum volume of 20mL is desirable.

Gastric lavage fluid – It is essential to contact the laboratory prior to taking this sample to arrange processing of same. 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 Microbiology by 9.00am

Blood Culture – 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). 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 and ethambutol susceptibility reported where appropriate.

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-fast bacilli not seen or seen with enumerator

Culture: TB Culture negative or *Mycobacterium* species isolated with sensitivities where appropriate

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Mycology – Fungal Microscopy and Culture (Dermatophytosis – skin, hair, nails)

Laboratory:	Microbiology (Mycology section)		
Specimen:	<p>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.</p> <p>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.</p> <p>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.</p>		
Comment:	<p>Some general points on specimen collection are given below:</p> <p>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.</p> <p>Do not use fixatives.</p> <p>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.</p> <p>Important note: If you clinically suspect <i>Hendersonula toruloidea</i> which causes dermatophyte-like lesions of the palms, soles and toe-webs or <i>Tinea nigra</i>, 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.</p>		
Test method:	<p>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.</p>		
Turnaround:	Direct smear:	1 week.	
	Culture:	1-3 weeks	
Report:	Direct smear:	<p>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.</p> <p>Positive microscopy is diagnostic for a fungal infection, however a negative microscopy result does not exclude a diagnosis of fungal infection.</p>	
	Culture:	Fungus not isolated or organism name isolated	

***Mycoplasma pneumoniae* IgM**

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Turnaround:	36 hours
Report:	Positive or negative

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Mycophenolic Acid

Laboratory: Sample referred from Clinical Biochemistry to Harefield Hospital
 Specimen: 0.5ml Plasma EDTA, plasma needs to be separated within 6 hours.
 Comment: 12 hour trough level
 Turnaround: 2 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

Neck Dissection Specimens

Laboratory: Histopathology (Diagnostic Laboratory)
 Specimen: Formalin fixed tissue
 Comment: Cork boards and pins are available from the Histopathology Specimen reception at ext. 22792 for orientation of these specimens. The specimen should be accompanied by a detailed diagram on/attached to the Request Form designating the appropriate levels/landmarks required for correct gross handling of the case.
 Turnaround: 80% of cases by day 7

***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.
 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.

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***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. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.
Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day
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

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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

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.

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.

Oestradiol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days

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Ref. Range: Follicular phase: 77 – 922 pmol/L
Ovulation: 140 - 2383 pmol/L
Luteal: 77 - 1145 pmol/L
Post Menopause: 37 - 103 pmol/L
Males: 40 - 162 pmol/L

Oncotype DX Testing

Laboratory: Specimen referred from Histopathology to Genomic Health Inc.,
Specimen: Tissue block
Turnaround: 7-10 days

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: 1 week
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: 3 Hours
Ref. Range: 275 – 295 mOsm/kg

Osmolality (Urine)

Laboratory: Clinical Biochemistry
Specimen: Spot urine sample
Turnaround: 1 Day
Ref. Range: Dependant on the patient's state of hydration

Ovarian Antibodies

Laboratory: Sample referred from Autoimmune Serology to Claymon Laboratories
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround: Approx. 3 Weeks

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Ref. Range: See report form, or visit internet site www.claymon.com 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 1/2 .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: See referral laboratory report

PAI-1 (Plasminogen Activator Inhibitor)

Laboratory: Sample referred from Haematology to Biomnis Claymon

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.

Turnaround: 1 month

Ref. Range: See referral lab report

Pancreatic Islet Cell Antibodies

Laboratory: Sample referred from Autoimmune Serology to 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 www.biomnis.ie for up to date referral test information.

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 15 mins

Ref. Range: Therapeutic Range 1.7 – 20mg/L
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.

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- Comment:** Specimens will be processed only by prior arrangement with the laboratory. Full clinical details are essential. Faeces specimens from patients with chronic diarrhoea, patients with a history of foreign travel or immunocompromised 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:** Faeces specimens for ova /parasites will be examined 2-3 times a week depending on staff availability.
- 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:** 5 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:** Positive or negative
-

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
-

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:** Histopathology (Diagnostic Laboratory)
- Specimen:** Formalin fixed tissue. Immediately placed in 10% Buffered Formalin and please state date and time specimen taken.
-

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Comment: Note: With complicated monochorionic twins where injection studies might be required please discuss with pathology before putting placenta into Formalin.
Note: A separate form is required for Products of Conception FOR-CUH-PAT-1627 (Consent to pathological examination of a fetus <12 weeks gestational age).

Turnaround: Turnaround: 80% in 7 days.

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 10⁹/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 Genetic Screen

Laboratory: Referred from molecular genetics lab in Biochemistry to LEEDS NHS via NCMG

Specimen: 3-5ml EDTA blood

Comment: NCMG request form available at www.genetics.ie
Please note: invoices will be issued directly to the referring clinician.

Turnaround: 40 days for 8 gene screen

Report: Sent to referring clinician and copy filed in pathology

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

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Ref. Range: Therapeutic Range 10-40 mg/L (Adult) Range quoted is appropriate for a trough sample.

Febrile convulsion in children - Range 15-20 mg/L

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
Ref. Range: Therapeutic Range 5-20mg/L Range quoted is appropriate for a trough sample.

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: Adult Range: 0.8 – 1.5
Paediatric Range: mmol/L 1.25 – 2.25 mmol/L
Up to 1 1.15 – 2.15 mmol/L
month – 1.95 mmol/L
1 –12 months 1.00 – 1.80 mmol/L
1 – 3 years
3 – 15 years

Phosphate (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 Hour urine collection, to be acidified as soon as possible in laboratory.
Turnaround: 1 Day
Ref. Range: 12.9 – 42 mmol/24 Hr

Pinworm

See Enterobius vermicularis

Platelet Aggregation Tests

Laboratory: Haematology

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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.
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,
Ref. Range: N / A, 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.
Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.

Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day
Report: Detected or not detected

PNH Paroxysmal nocturnal haemoglobinuria

Laboratory: Referred by Haematology to Haematology, St James Hospital, Dublin 8
Specimen: Blood 2 x 3mL, 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 3 weeks
Ref. Range: No evidence of PNH Clone/PNH Clone detected

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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.

Porphyria 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:	3 weeks	
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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range:	3.5 – 5.0 mmol/L (Plasma Potassium 3.4-4.5 mmol/L)

Potassium (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot or 24 Hr sample
Turnaround:	1 Day
Ref. Range:	30 – 90 mmol/24 Hr

Pouch of Douglas Fluid

See Sterile Body Fluid – Microscopy and Culture

Prader Willi Syndrome (PWS)

Laboratory:	Referred from Biochemistry to National Centre for Medical Genetics (NCMG)
Specimen:	Infants: 1ml EDTA blood Adults 3-5ml EDTA blood
Comment:	Copy of NCMG request form available on website www.genetics.ie
Turnaround:	6 weeks
Report:	Sent to referring clinician and copy of report filed in pathology

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
Ref. Range:	Positive or Negative or Inconclusive

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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: Mid – luteal level(7 day Pre-menstruation)> 30.0 nmol/L Suggests evidence of Ovulation (Royal College of Gynaecologists)
Follicular: 0.6-4.7 nmol/L Ovulation: 2.4-9.4 nmol/L
Luteal: 5.3-86.0 Post-Menopause: 0.3-2.5 nmol/L
Male: 0 – 0.2 nmol/L

Prolactin

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: Female: 110 - 562 mU/L; Male: 73 – 411 mU/L

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 62 – 82 g/L Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Protein (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 Hr sample
Turnaround: 1 Day
Ref. Range: < 140 mg/24hr

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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		
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
Turnaround:	3 – 4 weeks
Ref. Range:	

Protein/Creatinine Ratio (Urinary)

Laboratory:	Clinical Biochemistry
Specimen:	Spot urine
Turnaround:	1day
Ref. Range:	Protein/Creatinine: >45 mg/mmol is significant proteinuria

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Prothrombin DNA Mutation Studies (G20210A)

Laboratory: Haematology Molecular Genetics
Specimen: Blood 3mL purple Vacuette® (EDTA)
Comment: Forms part of a Thrombophilia screen.
Turnaround: 6 - 8 weeks
Ref. Range: Normal / Heterozygous /Homozygous, see 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, (e) assaying the specific coagulation Factor II. It also forms part of the Thrombophilia and/or Lupus screen.
Specimens must be received within 48hrs
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	10.5	9.7 – 11.3

PSA Total

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: 0 – 4.0 µg/L

PTH

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL EDTA plasma
Turnaround: 1 week
Ref. Range: 15 – 68 ng/L

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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: 4 Weeks

Pyruvate Kinase

Laboratory: Sample referred from Haematology to The Red Cell Centre, King's College Hospital, London, SE5 9RS Westminster Bridge Rd., London

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: 1 month.

Ref. Range: See referral laboratory report or contact King's College London, 0044 2032 999000

Q Fever

See *Coxiella burnetii* IgG and IgM

QuantiFERON®-TB Gold 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. **NB.** Only 1mL of blood per tube, under of overfilled bottles are not accepted. Shake vigorously x 10 times. Return the complete kit (in box).

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 within 12 hours after collection while white blood cells are still viable. Before the QFT is conducted, confirm arrangements for testing with the laboratory. Specimens are only accepted by this laboratory on Mondays, Tuesdays and Wednesdays before 2pm(excluding Bank Holidays). Test performed by reference laboratory (Biomnis Ireland, Sandyford Industrial Estate).

Turnaround: 1 week

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.

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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 or bleep 379. 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.
Turnaround:	80% cases verbal report in 2 days 80% cases fully authorised report in 2 weeks

Renal Stone

Laboratory:	Sample referred from Clinical Biochemistry to the Mater Hospital Dublin.
Specimen:	Renal Stone
Comment:	Renal Stone assayed for NH ₄ , 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

Respiratory Syncytial Virus (RSV) Antigen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	Nasopharyngeal aspirate in sterile container. Effort should be made to collect a liquid specimen. Sputum specimens and swabs are not suitable. If not tested immediately, specimens should be stored at 2 to 8°C for up to 24 hours.
Turnaround:	24 hours
Report:	Positive or negative. Positive results called back to requesting clinician.

Respiratory Viral Screen (Molecular)

Laboratory:	Microbiology
Specimen:	Viral swab (nasopharyngeal, throat), nasopharyngeal aspirate, sputum, broncho-alveolar lavage
Comment:	Adenovirus, Influenza A and B, Respiratory Syncytial Virus, Parainfluenza, Human Metapneumovirus. For immunocompromised patients, Herpes Simplex Virus 1/2 and Cytomegalovirus may also be included in screen. Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). During Influenza season a Respiratory viral screen for Adenovirus, Influenza A and B, Respiratory Syncytial Virus, Parainfluenza, Human Metapneumovirus is processed in CUH.
Turnaround:	5 working days
Report:	Detected or not detected

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

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Turnaround: Emergency specimens: < 2 hours
Routine specimens: 8 - 24 hours

Ref. Range:	1 day: 110 - 450 x 10 ⁹ /l 14 days: 10 - 80 x 10 ⁹ /l 2 months: 30 - 200 x 10 ⁹ /l	1 Year: 30 - 130 x 10 ⁹ /l 12 years: 30 - 130 x 10 ⁹ /l Adult: 23- 93 x 10 ⁹ /l
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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: 3 weeks
Report: Positive or negative

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 ≤3 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. Rubella IgM testing is recommended for the diagnosis of recent primary rubella infection.
Turnaround: 36 hours
Report: Quantitative value IU/mL

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Rubella IgM Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Patient history required. The presence of IgM antibodies suggests recent infection with the virus.
Turnaround: 36 hours
Report: Positive or negative

Salicylate

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 1 Hour
Ref. Range: Therapeutic Range 0-193 mg/L
In adults, symptoms of Salicylate toxicity may occur at levels >300mg/L

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 (PHE National Parasitology Reference Laboratory (NPRL), London).
Turnaround: 3 weeks
Report: Positive or negative

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.

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: Male 13-71 nmol/L; Female 19.8-115 nmol/L AI < 11 (female)

Sirolimus

Laboratory: Sample referred from Clinical Biochemistry to Harefield Hospital
Specimen: 4.0 mL blood in an EDTA sample tube.
Turnaround: 2 weeks

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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: Neuropathology
Specimen: 3x3mm skin bx taken into sterile culture medium
Comment: Please contact Neuropathology in advance. Culture medium available from Neuropathology Lab.
Sample sent to Sheffield Children's Hospital. Protocols available on request.
Turnaround: 4-6 weeks
Ref. Range: N/A

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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 132 – 144 mmol/L

Sodium (Urinary)

Laboratory: Clinical Biochemistry
Specimen: 24 Hr sample
Turnaround: 1 Day
Ref. Range: 130 – 220 mmol/24 Hr (reflects daily intake)

Spinal Muscular Atrophy (SMA)

Laboratory: Referred from Biochemistry to National Centre for Medical Genetics (NCMG)
Specimen: Infants: 1ml EDTA blood
Adults 3-5ml EDTA blood
Comment: Copy of NCMG request form available on website www.genetics.ie
Turnaround: 6 weeks
Report: Sent to referring clinician and copy of report filed in pathology

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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 <i>Haemophilus</i> species and <i>S. pneumoniae</i> 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. <i>Burkholderia pseudomallei</i> and <i>Nocardia</i> 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 <i>Burkholderia</i> spp. and fungal culture, which are reported if positive.
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.

STD Screen

Laboratory:	Microbiology (Infectious Diseases Serology)
Specimen:	4mL clotted blood
Comment:	Screen includes 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 (external confirmatory testing required).
Report:	Positive or negative

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 Biomnis Laboratories.
Specimen:	Blood, 4 mL red top Vacurette (or similar container for clotted blood)
Turnaround:	Approx. 3 Weeks
Ref. Range:	See report form, or visit internet site www.biomnis.ie for up to date referral test information

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Strongyloides Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
 Specimen: 4mL clotted blood
 Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London).
 Turnaround: 3 weeks
 Report: Positive or negative

Strongyloides Microscopy and Culture

Laboratory: Microbiology (Infectious Diseases Serology)
 Specimen: Faeces
 Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London). Faecal specimens should NOT be refrigerated.
 Turnaround: 3 weeks
 Report: Positive or negative

Surgical Specimens for Histological Examination

Laboratory: Histopathology (Main Laboratory)
 Specimen: Formalin Fixed Tissue
 Turnaround: 5-6 working days (Urgent cases can be fast-tracked by request.)
 Ref. Range: Not applicable

Sweat Test

Laboratory: Clinical Biochemistry
 Specimen: Sweat
 Comment: Sweat is collected in GD ward or GC Day Unit
 Turnaround: Done daily.
 Ref. Range: Contact CUH Biochemistry Laboratory

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 TPPA (*Treponema pallidum* particle agglutination). New syphilis positives are sent to a reference laboratory for confirmation.
 Turnaround: Negative: 36 hours
 Referred samples: 2 weeks
 Report: Positive or negative

Tacrolimus (FK506 / Prograf)

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood in an EDTA tube
 Comment: Trough sample required. Analysed on Thursday.
 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.

Tear Duct – Culture

See Lacrimal

Temporal Artery Biopsies

Laboratory: Neuropathology
 Specimen: Formalin-fixed artery
 Turnaround: 3 days

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Testosterone

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 1 Week

Ref. Range:	Male:	<50Y	8.3	30.2
		>50Y	7.7	24.8
	Female:	<50Y	0.48	1.85
		>50Y	0.43	1.24
	Children:	Please contact Laboratory for age-related Reference range		

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: 2-3 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.

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 β -haemolytic streptococci, other bacteria (if appropriate), or yeasts.

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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. 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-Cardiolipin is also included as part of the screen (which includes the Beta 2-Glycoprotein 1 assay when appropriate) if a clotted sample is received. Requests must conform with BCSH guidelines Samples without Clinical details WILL NOT be processed.
Turnaround:	3 – 4 weeks
Ref. Range:	Refer to individual assays

Thyroglobulin & Thyroglobulin Antibodies

Laboratory:	Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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:	0 – 5.6 IU/mL

Thyroid Stimulating Hormone (TSH)

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL blood in plain tube (clotted sample)
Turnaround:	4 days
Ref. Range:	0.35 – 4.94 mU/L Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

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.

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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 Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.

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

Comment: Tested for Benzodiazepines, Barbiturates, Alcohol, Tricyclics, Paracetamol and Salicylate

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.

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

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 (PHE National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 3 weeks

Report: Positive or negative

Toxoplasma gondii IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Turnaround: 36 hours

Report: Positive or negative

Toxoplasma gondii IgM Antibody

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

Turnaround: Negative samples: 36 hours
Positive Toxoplasma IgM must be confirmed by a reference laboratory – at least 3 weeks

Report: Positive or negative

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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: 2 weeks

Ref. Range: Contact laboratory

Transferrin

Laboratory: Clinical Biochemistry

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

Turnaround: 4 Days

Ref. Range: 1.8 – 3.2 g/L

% 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 (PHE National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 3 weeks

Report: Positive or negative

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 Toxicology Laboratory BEAUMONT Hospital Dublin, 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 Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

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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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
GP or OPD results posted within 4 days.
Ref. Range: 0.3 – 1.7 mmol/L

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 = <34ng/L (male)
is = <16ng/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 (PHE National Parasitology Reference Laboratory (NPRL), London)
Turnaround: 3 weeks
Report: Positive or negative

Tryptase (Mast Cell)

Laboratory: Sample referred from Clinical Biochemistry to 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 www.biomnis.ie 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 Immuncap 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 Claymon 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 www.claymon.com for up to date referral test information

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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 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Ref. Range: Male: 236 – 486 $\mu\text{mol/L}$, Female: 160 – 393 $\mu\text{mol/L}$

Urate (Urinary)

Laboratory: Clinical Biochemistry
 Specimen: 24 Hour collection
 Turnaround: 1 Day
 Ref. Range: 1500 – 4500 $\mu\text{mol/24 Hr}$

Urea (Blood)

Laboratory: Clinical Biochemistry
 Specimen: 4.0 mL blood in plain tube (clotted sample)
 Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
 Ref. Range: 2.8 – 8.4 mmol/L

Urea (Urinary)

Laboratory: Clinical Biochemistry
 Specimen: Spot or 24 Hr urine sample
 Turnaround: 1 Day
 Ref. Range: 428 – 714 mmol/24 Hr

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 Schistosomiasis

See Schistosoma haematobium

Urinary *Streptococcus pneumoniae* Antigen

Laboratory: Microbiology (Infectious Diseases Serology)
 Specimen: Urine
 Turnaround: 36 hours
 Report: Positive or negative

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Urine Microscopy and Culture

Laboratory: Microbiology (Main laboratory)

Specimen: Ideally, a minimum of 1mL is required for routine culture. The specimen should be collected into a clean, sterile, leakproof container.

For samples which may be delayed in delivery to the laboratory (>24hrs) a sample container containing boric acid (preservative) should be used, fill to the line marked.

Note: A minimum of 5mL is *essential* for boric acid samples, where smaller volumes are collected, do not use a boric acid container.

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* (see same). A fresh specimen is essential for the investigation of casts.

Specimen Types

Midstream urine (MSU) Recommended for routine use. Genitalia are cleaned. The first part of voided urine is discarded and without interrupting the flow, approximately 10mL is collected into a sterile container. 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 leakproof container. 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 sterile container and then an aliquot sent for examination.

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 (20mL).

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 >20 /cmm., but the following are cultured in all cases; Antenatal, <16 year, Renal, ICU, potentially immunocompromised.

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

Ref. Range: 50-100 mg/L Range is appropriate for a trough sample.

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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: 24 hours; Final: 48-72 hours
Report: "VRE not isolated",
Enterococcus species isolated with the following comment: This is a Vancomycin resistant *Enterococcus*

Varicella-zoster Virus IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: VZV IgG testing is performed on all antenatal patients
Turnaround: 36 hours
Report: Positive or negative

Varicella-zoster Virus IgM Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround: 5 working days
Report: Positive or negative

Varicella-zoster Virus Molecular

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: CSF (1mL), viral swab (skin, eye), vesicle fluid
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround: 5 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

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Comment: Adenovirus, Herpes Simplex Virus 1/2, Varicella-zoster Virus.
Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).

Turnaround: 5 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: 1.19 – 1.43 (at 37 °C) Refer to Biochemistry 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 a plain tube (clotted sample)

Comment: Consultant request only. Protect from light.

Turnaround: 3 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: 120 – 650 ng/l
120 – 135 ng/l indeterminate

1, 25 Dihydroxy Vitamin D (Calcitrol)

Laboratory: Sample referred from Clinical Biochemistry to BIOMNIS Laboratories

Specimen: MI 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 www.biomnis.ie for up to date referral test information.

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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: <25 nmol/L: Deficient
 20-50 nmol/L: Insufficient
 50-75 nmol/L: Adequate
 >75 nmol/L: Optimal
 >125 nmol/L: Risk of Excess

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: 3 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: 3 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: 6 weeks
 Ref. Range: Qualitative result

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%)
 Comment: Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).
 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
 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

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VWF Cleaving Protease (vWFcp) Assay (ADAMTS13 Activity and Antibodies)

Laboratory: Sample is referred from Haematology to Molecular Genetics Laboratory, University College London,

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 to be completed, must be sent on dry ice and samples can only be referred Monday or Tuesday (via Biomnis).

Turnaround: 1 – 2 months

Ref. Range: See report or contact University College London, 1st Floor Chenies Mews.

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

Turnaround: 2 – 3 Weeks

Ref. Range: N/A

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: Positive or negative

Whipples Disease

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL EDTA blood, CSF

Comment: PCR test performed by a reference laboratory (Molecular Pathology, Leeds)

Turnaround: 14 days

Report: Positive or negative

Whooping Cough

See *Bordetella* Species – Culture

Winter Vomiting Bug

See *Norovirus – Norwalk-like viruses (NLV) / Small Round Structured Viruses (SRSV)*

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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	Within 2 hours of receipt.	
	(pus /fluid):		
	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.	

Yersinia Antibodies

Laboratory:	Microbiology (Infectious Diseases Serology)		
Specimen:	4mL clotted blood		
Comment:	Performed by reference laboratory (Gastrointestinal Bacteria Reference Unit (GBRU), London)		
Turnaround:	3 weeks		
Report:	Positive or negative for <i>Yersinia enterocolitica</i> and <i>Yersinia pseudotuberculosis</i>		

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:	10 days		
Report:	Positive or Negative (Serology), Detected or Not Detected (Molecular)		

Zinc

Laboratory:	Clinical Biochemistry		
Specimen:	4.0 mL blood in a metal-free plain tube (clotted sample).		
Turnaround:	1 week		
Ref. Range:	9 – 22 µmol/L		

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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 172riiodothy 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
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

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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	Methicillin-Resistant <i>Staph aureus</i>
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
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

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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 test
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	Toxoplasmosis, rubella cytomegalovirus, herpes
TPHA	Treponema pallidum haemagglutination
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

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15 NAMES AND ADDRESSES OF REFERRAL LABORATORIES

Name	Address	Referring Dept
Addenbrookes Hospital	Addenbrookes Hospital Cambridge, Diagnostics Services, Department of Haematology, Hills Road, Cambridge, CB2 0QQ	Haematology
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
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
Biomnis Ireland	Three Rock Road, Sandyford Business Estate, Dublin 18, Ireland	Biochemistry, 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's Hospital	Cancer Molecular Diagnostics, CMD, St James Hospital, James's St., Dublin 8	Haematology
Cancer Molecular Diagnostics, St. James's Hospital	Dr Elizabeth Vandenberghe, Cancer Molecular Diagnostics, St. James's Hospital, Dublin 8	Pathology
Central Pathology Haematology, St James's Hospital	St James's Hospital, James's St., Dublin 8	Haematology
Microbiology, Central Pathology Laboratory	St James's Hospital, James's St., Dublin 8	Clinical Microbiology
Molecular Laboratory	Beaumont Hospital, Dublin 9	Pathology
Molecular Microbiology, Central Pathology Laboratory	St James's Hospital, James's St., Dublin 8	Clinical Microbiology
Clinical Chemistry	Sheffield Children's Hospital, Western Bank, Sheffield S10 2TH	Pathology
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	Kings College Hospital Denmark Hill, LondonSE5 9RS, United Kingdom020 3299 9000	Biochemistry
Department for Bioanalysis and Horizon Technologies	Molecular Identification Services Unit (MISU) :Microbiology Services Colindale61 Colindale AvenueLondonNW9 5HT	Clinical Microbiology
Department of Cellular Pathology, The Adelaide and	Department of Cellular Pathology, The Adelaide and Meath Hospital incorp. The National Children's Hospital, Tallaght,	Pathology

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Name	Address	Referring Dept
Meath Hospital	Dublin 24	
Department of Clinical Chemistry and Newborn Screening, Sheffield	Sheffield Children's NHS Trust Western Bank Sheffield S10 2TH, United Kingdom	Biochemistry
Department of Immunology, North General Hospital	Herries Road, Sheffield S5 7AU	Biochemistry
Department of Pathology, Ninewells Hospital	Department of Pathology, Ninewells Hospital, Dundee, DD1 9SY, Scotland	Pathology
Dept of Medical Biochemistry	University Hospital of Wales Cardiff CF 14 4XY	Biochemistry
Endocrinology Laboratory	Department of Specialist Laboratory Medicine Block 46 St James Hospital Leeds Gen LS9 7TF	Biochemistry
Freeman Hospital	Freeman Hospital Freeman Road High Heaton Newcastle Upon Tyne NE7 7DN United Kingdom	Biochemistry
Galateau-Salle, Prof Francoise,	Department of Pathologie Route de la DeDelivandre CHU-Cote de Nacre, 14033-CAEN CEDEX, France	Pathology
Gastrointestinal Bacteria Reference Unit (GBRU)	Bacteriology Reference Department, PHE Microbiology Services, 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, Immunology Department, Molecular Genetics, Level 4, Camelia Botnar Laboratories Great Ormond Street Hospital, Great Ormond Street, WC1N 3JH	Haematology
Viapath, GSTS Pathology	Viapath, GSTS Pathology Centre, The Human Nutristasis Unit, The Centre for Haemostasis and Thrombosis, 1st Floor North Wing, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH UK	Haematology
GSTS Pathology Kingspath Hospital, King's College Hospital NHS Foundation Trust	Mr Christopher Lambert, The Red Cell Centre, King's College Hospital, London, SE5 9RS Westminster Bridge Rd., London	Haematology
Haematology, Coombe Hospital Dublin	Coombe Women and Infants University Hospital, Cork St., Dublin 8	Haematology
Haematology, Our Lady's Hospital Crumlin	Our Lady's Children's Hospital, Division of Cytogenetics (Oncology), Crumlin, Dublin 12, Ireland	Haematology
Haematology Dept, St. James hospital	Haematology Dept, St. James hospital, Dublin 8	Haematology
Harefield Hospital	Mr Neil Leaver Principal Clinical Scientist, Harefield Hospital, Harefield 90 UB United Kingdom	Biochemistry
HPA Laboratory	P.O. Box 209 Manchester Medical Microbiology Partnership Clinical Sciences Building Manchester Royal Infirmary Oxford Road	Biochemistry
Immunology Department and Protein Reference Unit	P.O Box 894 Sheffield S5 7YT United Kingdom	Biochemistry
Dept of Neuropathology	3 rd Flr Pathology, Lab Med Building, Southern General Hospital, 1345 Govan Rd, Glasgow G51 4TF, UK.	Pathology
Irish Meningitis & Sepsis Reference Laboratory (IMSRL)	The Children's University Hospital, Temple St, Dublin 1, Ireland	Clinical Microbiology

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Name	Address	Referring Dept
Irish Mycobacterial Reference Laboratory	Clinical Microbiology, St. James's Hospital, James's Street, Dublin 8.	Clinical Microbiology
King's Healthcare Trust	Dr Raja, Trace Element Unit Dept. of Clinical Biochemistry King's Healthcare Trust Denmark Hill London, SE5 9RSEngland	Pathology
Malaria Reference Laboratory	PHE Malaria Reference Laboratory, Faculty of Infectious & Tropical Diseases, London School of Hygiene & Tropical Medicine, Keppel Street, LONDON, WC1E 7HT	Haematology
Metabolic Investigation Laboratory, Children's University Hospital	Temple St., Dublin 1	Biochemistry
Microbiology Dept. University Hospital Waterford	University Hospital Waterford, Dunmore Road, Waterford	Clinical Microbiology
Micropathology Ltd	University of Warwick Science Park, Venture Centre, Sir William Lyons Road Coventry CV4 7EZ	Clinical Microbiology
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 Pathology	Level 6, Clinical Sciences Building, St James's University Hospital, Beckett Street, Leeds LS9 7TF, England	Clinical Microbiology
MRSA National Reference Laboratory	St. James's Hospital, James's Street, Dublin 8.	Clinical Microbiology
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
National Centre for Medical Genetics	National Centre for Medical Genetics Our Lady's Children's Hospital Crumlin Dublin 12, Ireland	Biochemistry
National Centre for Medical Genetics	National Centre for Medical Genetics Our Lady's Children's Hospital Crumlin Dublin 12, Ireland	Haematology
National Centre for Medical Genetics (NCMG)	Our Lady's Hospital for Sick Children, Crumlin, Dublin 12, Ireland	Biochemistry
National Coagulation Laboratory	National Coagulation Laboratory, Centre for Clinical Pathology and Laboratory Medicine, (CPLM), St James Hospital, Dublin 8	Haematology
Haemostasis Molecular Diagnostics (HMD)	Haematology Dept. to Haemostasis Molecular Diagnostics (HMD), National Coagulation Laboratory, Centre for Clinical and Laboratory Medicine, CPLM, St James Hospital, Dublin 8	Haematology
National Mycobacterium Reference Laboratory	Abernethy Building Institute of Cell and Molecular Science (ICMS)2 Newark Street London E1 2AT	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,	Haematology

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Name	Address	Referring Dept
	500 North Brighton Park Northway, Filton, Bristol, B534 7QH, UK	
North Bristol NHS Trust	Dept. of Clinical Biochemistry, Pathology Sciences, Southmead Hospital, Westbury on Trym, Bristol, BS10 5NB	Biochemistry
Nutristasis Unit	Haemostasis and Thrombosis GSTS Pathology 4th floor, North Wing St Thomas' Hospital Westminster Bridge Road London SE1 7EH	Biochemistry
National Haemoglobin Reference Laboratory	Dr. John Old, National Haemoglobinopathy Reference Laboratory, Molecular Haematology, Level 4, John Radcliffe Hospital, Oxford OX3 9DU, United Kingdom	Haematology
Oxford University Hospitals NHS JR320	NHS Hospital: P11174259 Oxford Pathology Laboratory MH Research	Haematology
PHE National Parasitology Reference Laboratory (NPRL)	Department of Clinical Parasitology, Hospital for Tropical Diseases, Mortimer Market, Capper Street, London WC1E 6JB, England	Clinical Microbiology
PHE South West Laboratory	North Bristol NHS Trust, Pathology Sciences Building, Science Quarter, Southmead Hospital, Bristol, BS10 5NB, England	Clinical Microbiology
Primary Ciliary Dyskinesia (PCD) Diagnostic Service, University Hospital Southampton	Patricia Goggin PCD EM Scientist Biomedical imaging Unit Mail point 12 South 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)	Public Health England, Porton Down, Salisbury, Wiltshire SP4 OJG, England	Clinical Microbiology
Respiratory and Vaccines Preventable Bacteria Reference Unit (RVPBRU)	Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology, Biochemistry
Rotunda Hospital	Rotunda Hospital, Parnell Street, Dublin 1, DO1 P5W9	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
SAS Centre	c/o Ground Floor Oncology Charing Cross Hospital Fulham Palace Road LONDON W6 8RF	Biochemistry
SAS Peptide Hormones, Royal Surrey County Hospital	Clinical Laboratory, Royal Surrey County Hospital, Egerton Road, GUILDFORD GU2 5XX	Biochemistry
SAS Trace Element Unit	Division of Laboratory Medicine Southampton University Hospitals NHS Trust Mail Point 804 Southampton General Hospital Tremona Road SOUTHAMPTON SO16 6YD	Biochemistry
Sexually Transmitted Bacteria Reference Laboratory (STBRL)	Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
TDL Genetic Referrals	The Doctor's Laboratory Genetics, 60 Whitfield Street, London W1T 4EU	Biochemistry
The Antimicrobial Resistance	Bacteriology Reference Department, PHE Microbiology	Clinical

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Name	Address	Referring Dept
and Healthcare Associated Infections Reference Unit (AMRHAI)	Services61 Colindale Avenue London NW9 5EQ	Microbiology
The Doctors Laboratory Ltd	60 Whitfield Street, London, W1T 4EU, UK	Clinical Microbiology
The National Creutzfeldt-Jakob Disease Research & Surveillance Unit	Room FU 529, First Floor, Chancellor's Building, 49 Little France Crescent, Edinburgh EH16 4SB, UK	Pathology
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 5XH Endocrine Laboratory	Biochemistry
University College London UCL	University College London, Molecular Genetics Laboratory, University College London, Hospital, NHS Foundation Trust, 307 Ellston Road, London NW1 3AD	Haematology
Virology Reference Department	PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England	Clinical Microbiology
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