LABORATORY MEDICINE USER GUIDE
UNIVERSITY HOSPITAL GALWAY

The philosophy of care for Galway University Hospital (GUH) is to provide high quality and equitable care for all patients, in a safe and secure environment and to achieve excellence in clinical practice teaching, training and research. The Laboratory Medicine Department is committed to providing the highest quality diagnostic and consultative service for all its users.

Although diagnostic laboratory tests are generally valid and reliable, all laboratory tests have limitations and results should be interpreted in association with findings from history, examination and other diagnostic tests. In general negative/not detected tests results should not be interpreted in isolation as excluding a diagnosis because false negative results are a recognized limitation of most assays/tests. Likewise, in general, a positive/detected test result should not be taken in isolation as confirming a diagnosis because false positive results are a recognized limitation of most assays/tests. Please telephone the clinical staff in the laboratory if you would like to discuss the interpretation of a result.

Special counselling may be needed for examination results with serious implications for the patient. It is the responsibility of the test requester to ensure that examination results with serious implications for the patient are not communicated to the patient without the opportunity for acceptable counselling.

1. The Laboratory Medicine Service

Galway University Hospital, Laboratory Medicine Department aims to act as a centre of service excellence, innovation and research to support the health care mission of the HSE West and North West Region and the HSE nationally.

West North West Medical Laboratory Directorate

The Laboratory Medicine Department at Galway University Hospital (GUH) is part of the Laboratory Medicine Directorate (the Directorate) which reports to the West North West Management Team.

GUH together with Portiuncula University Hospital Ballinasloe (PUH), Mayo University Hospital (MUH), Sligo University Hospital (SUH), Letterkenny University Hospital (LUH) and Roscommon University Hospital (RUH) have been combined into one regional group, with one overall group management team, one financial budget and one WTE ceiling. This new formation is referred to as West North West Region. This is subdivided into 4 Integrated Health Areas, GUH is within the Galway/Roscommon IHA.

The information contained in this handbook relates to the Laboratory services provided at GUH currently.

Clinical Director:	Prof. Margaret Murray	Email: margaret.murray@hse.ie
Associate Clinical Director for the Laboratories:	Dr. Sine Phelan	Email: Sine.Phelan@hse.ie

Address Details:
Laboratory Medicine Directorate, University Hospital Galway, Newcastle Road

Galway, H91 YR71

Laboratory Medicine Key Disciplines:

Key Disciplines	Key Support Services
Blood & Tissue Establishment	Phlebotomy
Clinical Biochemistry	Frontline Specimen Reception
Clinical Immunology	General Laboratory Accounts
Anatomic Pathology	Mortuary-Autopsy and PM Services
Haematology	
Medical Microbiology and Virology	

The purpose of this manual is to act as a reference guide for all users. Every effort has been made to ensure that the information provided herein is current and accurate. The manual is subject to regular review and revision.

The manual should be used as a guide only, any queries arising or required in relation to laboratory services should be addressed directly by contacting the relevant department or the Laboratory Manager. The Laboratory Medicine Department shall not be liable to users of the manual for any consequential action by the user other than to request the user to utilize the manual strictly as a guide reference only.

2. General Information

2.1 Location

The Laboratory Medicine Department is located on the right hand side at the rear of the main hospital block. Reception and Specimen Delivery is located by the back of the laboratory building near the back entrance to the hospital grounds.
Postal Address: Specimen Reception Laboratory, University Hospital Galway, Newcastle Road, Galway.

2.2 General Enquiries

The four-digit numbers listed below can be dialled directly from within GUH.
When calling from outside the hospital insert (091) 54 or 89 before the extension number for GUH.

Telephone requests for results, sampling procedures or add-on tests should be directed to the appropriate department.
The telephone enquiry service should be used for emergency enquires only.

Blood and Tissue Establishment		
Blood Transfusion		4422 / 4909
Tissues including stem cells		2497 / 3451
Haemovigilance / Biovigilance Officers	(Bleep 640/641)	4994
Clinical Code Red Massive Haemorrhage Clinical Activation		4306

Clinical Biochemistry	
Clerical Office	2740 / 2741
Out of Hours Enquiries (also available between 11:30-13:00)	4418

Clinical Immunology	
Immunology	4401
Office	4402

Haematology	
General Haematology	4419
Special Haematology	4284
Routine Coagulation	4283
Special Coagulation	4995
Haematinics	4880
Bone Marrows/Flow cytometry	4284

Anatomic Pathology : Histopathology, Cytopathology and Molecular Pathology	
General Enquiries	4078
Cytopathology	4883

Medical Microbiology	
(Phone Enquiries 09 :30-13 :00 and 15:30-17:00) only General Enquiries	2477
Diagnostics (Blood cultures, CSF, Swabs, Tissue & Fluids)	4411
Urines	4411
Faeces	4669
Respiratory & TB culture	2525
Public Health Laboratory	4916
National Reference Laboratory	4628

Virology	
General Enquiries	4398

Please note the method of contacting **the on-call medical scientist** for the following departments:

Department:	Monday-Friday 8pm-12am (midnight)	Monday-Friday 12am (midnight)-8am	Weekends/Bank Holidays 8am-12am (midnight) *Blood Transfusion slightly different on call weekend hours. See Blood and Tissue Column below for these hours	Weekends/Bank Holidays 12am (midnight)-8am **Blood Transfusion slightly different on call weekend hours. See Blood and Tissue Column below for their full hours. Note for Transfusion on call hours requiring contact via SWITCH the end time of the post-midnight session is 10am for on call on Friday post-midnight and Saturday post midnight as well as Bank Hol. Sunday post midnight here the end time is 10am for contact via SWITCH then it returns to the phone extensions listed above.
Biochemistry	4418	Contact the department via the **Telephone Services team -dial 9** and request connection with laboratory department you wish to speak with)	4418	Contact the department via the **Telephone Services team -dial 9** and request connection with laboratory department you wish to speak with)
Blood and Tissue Establishment On Call hours here are: Sun to Thursday 20:00 – 08:00 Friday 20:00 – 10:00am Sat: 10am – 10am Sun: 10am – 8am Bank Hol Sun: 10am – 10am Bank Hol Mon 10am – 8am	4909/ 4422		4909/ 4422 Use these extensions: Sat is 10am – 00:00 (Post-Midnight via SWITCH) Sun is 10am – 00:00 (Pos- Midnight is via SWITCH) Bank Hol Mon 10am – 00:00 (Post-Midnight is Via SWITCH	
Haematology	4419		4419	
Microbiology	4411		4411	

2.3 Contact Information

Key members of staff are listed below including their position and contact information.

Laboratory	Name		Contact
Blood and Tissue Establishment	Dr. Amjad Hayat	Consultant Haematologist	**Amjad.hayat@hse.ie** Phone Ext: 2625
	Ms. Margaret Tarpey	Chief Medical Scientist	**Margaret.tarpey@hse.ie** Phone Ext : 4623
Clinical Biochemistry	Dr. Damian Griffin	Consultant Chemical Pathologist	**damian.griffin@hse.ie** Phone Ext : 4825
	Dr. Verena Gounden	Consultant Chemical Pathologist	**Verena.Gounden@hse.ie** Phone ext. 8200
	Ms. Martina Doheny	Chief Medical Scientist	**martina.doheny@hse.ie** Phone Ext : 4499
	Dr. Janice Reeve	Principal Clinical Biochemist	**janice.reeve@hse.ie** Phone Ext : 8752
	Ms. Karen Heverin	Principal Clinical Biochemist	**karen.heverin@hse.ie** Phone Ext: 8644
	Office		Phone Ext : 2740/2741
Clinical Immunology	Dr. Vincent Tormey	Consultant Immunologist	**vincent.tormey@hse.ie** Phone Ext : 4402
	Dr. Caríosa Lee-Brennan	Consultant Immunologist	**Cariosa.Lee-Brennan@hse.ie** Phone Ext : 3957
	Mr. Arthur McQuaid	Chief Medical Scientist	**arthur.mcquaid@hse.ie** Phone Ext : 4587
	Specimen Reception		Immunology.uchg@hse.ie Phone Ext : 4401
	Office		Phone Ext : 4402
Anatomic Pathology: Histopathology, Cytopathology and Molecular Pathology	Dr. Caroline Brodie	Consultant Pathologist	**caroline.brodie@hse.ie** Phone Ext : (54) 2017
	Prof. Grace Callagy	Consultant Pathologist	**grace.callagy@hse.ie** Phone Ext: (54) 4884
	Dr. Teresa McHale	Consultant Pathologist	**teresa.mchale@hse.ie** Phone Ext: (54) 3845
	Dr. Ramadan Shatwan	Consultant Pathologist	**ramadan.shatwan@hse.ie** Phone Ext: (54) 2721

Laboratory	Name		Contact
	Dr. Mary Casey	Consultant Pathologist	**maryb.casey@hse.ie** Phone Ext: (54) 4928
	Dr. Tom Fitzgerald	Consultant Pathologist	**thomas.fitzgerald@hse.ie** Phone Ext: (54) 2351
	Dr. Yi Ling Khaw	Consultant Pathologist	**yiling.khaw@hse.ie** Phone Ext: (54) 3852
	Dr. Margaret Sheehan	Consultant Pathologist	**margaret.sheehan1@hse.ie** Phone Ext: (54) 2016
	Dr. Aoife Canney	Consultant Pathologist	**Aoife.canney@hse.ie** Phone Ext: (89) 3316
	Dr. Sean Hynes	Consultant Pathologist	**Sean.hynes@hse.ie** Phone Ext: (54) 3493
	Dr. Birgit Tietz	Consultant Pathologist	**birgit.tietz@hse.ie** Phone Ext: (54) 2707
	Dr. Helen Ingoldsby	Consultant Pathologist	**Helen.ingoldsby@hse.ie** Phone Ext: (89) 3792
	Dr. Sine Phelan	Consultant Pathologist	**Sine.phelan@hse.ie** Phone Ext: (89) 3793
	Dr. Anne Marie Quinn	Consultant Pathologist Head of Department	**AnneMa.Quinn@hse.ie** Phone Ext: (54)2331
	Dr. Emer Caffrey	Consultant Pathologist	**emer.caffrey@hse.ie** Phone Ext: 3061
	Dr. Susanne Schneider	Consultant Pathologist	**Susanne.Schneider@hse.ie** Phone Ext: 3061
	Dr. Laura Aalto	Consultant Pathologist	**Laura.Aalto2@hse.ie** Phone Ext: 3846
	Dr Aliaa Shalaby	Consultant Pathologist	**Aliaa.Shalaby@mailn.hse.ie** Phone Ext : 3445
	Dr Kevin Culligan	Consultant Pathologist	**Kevin.Culligan@hse.ie** Phone Ext: 3853
	Dr Gian Raulli	Consultant Pathologist	**Gian.Raulli@hse.ie** Phone Ext: 3060
	Dr Daniela Catargiu	Consultant Pathologist	**Daniela.Catargiu@hse.ie** Phone Ext: 3061

Laboratory	Name		Contact
	Guillermo Garcia-Diego	Consultant Pathologist	**Guillermo.Garcia-Diego@hse.ie** Phone Ext: 3444
	Ms. Loretta Lydon	Chief Medical Scientist	**Loretta.Lydon@hse.ie** Phone Ext: (54) 4408
	Office		Phone Ext: (54) 4078
Haematology	Prof. Margaret Murray	Consultant Haematologist	**Margaret.murray@hse.ie** Phone Ext: 4591
	Dr. Amjad Hayat	Consultant Haematologist	**Amjad.hayat@hse.ie** Phone Ext: 2625
	Dr. Ruth Gilmore	Consultant Haematologist	**Ruth.gilmore@hse.ie** Phone Ext: 3822
	Dr. Janusz Krawczyk	Consultant Haematologist	**Janusz.krawczyk@hse.ie** Phone Ext: 3227
	Prof. Michael O'Dwyer	Consultant Haematologist	**michael.odwyer@hse.ie** Phone Ext: 2125
	Dr. Yizel Nunez	Consultant Haematologist	**Yizel.Nunez@hse.ie** Phone Ext: 3646
	Dr. Niamh Keane	Consultant Haematologist	**NiamhA.Keane@hse.ie** Phone Ext: 3058
	Dr Tracy Murphy	Consultant Haematologist	**Tracy.murphy5@hse.ie** Phone Ext:3227
	Dr Jill Coll	Consultant Haematologist	**Jill.Coll@hse.ie** Phone Ext:8415
	Mr Mark Lyons	Chief Medical Scientist	**Mark.lyons@hse.ie** Phone Ext: 4514
	Office		Phone Ext: 4281
Medical Microbiology	Dr. Una Ni Riain	Consultant Microbiologist	**Una.niriain@hse.ie** Phone Ext: 3779
	Prof. Martin Cormican	Consultant Microbiologist	**martin.cormican@hse.ie** Phone Ext: 4146
	Dr. Dimitar Nashev	Consultant Microbiologist	**Dimitar.Nashev@hse.ie** Phone Ext : 8731
	Dr. Teck Wee Boo	Consultant Microbiologist	**teck.boo@hse.ie** Phone Ext : 3783
	Dr. Deirbhile Keady	Consultant Microbiologist	**deirbhile.keady@hse.ie** Phone Ext : 2013

Laboratory	Name		Contact
	Dr. Ruth Waldron	Consultant Microbiologist	Ruth.Waldron@hse.ie Phone Ext : 4146
	Dr. Roisin Mulqueen	Consultant Microbiologist	**Roisin.mulqueen3@hse.ie**
	Mr. Tom Whyte	Chief Medical Scientist	**Tom.whyte@hse.ie** Phone Ext : 4429
	Office		Phone Ext: 4404
Virology	Dr. Deirbhile Keady	Consultant Microbiologist	**deirbhile.keady@hse.ie** Phone Ext : 2013
	Dr. Teck Wee Boo	Consultant Microbiologist	**teck.boo@hse.ie** Phone Ext : 3783
	Prof. Martin Cormican	Consultant Microbiologist	**martin.cormican@hse.ie** Phone Ext : 4146
	Dr. Una Ni Riain	Consultant Microbiologist	**Una.niriain@hse.ie** Phone Ext : 3779
	Dr. Dimitar Nashev	Consultant Microbiologist	**Dimitar.Nashev@hse.ie** Phone Ext : 8731
	Dr. Ruth Waldron	Consultant Microbiologist	**Ruth.Waldron@hse.ie** Phone Ext : 4146
	Dr. Roisin Mulqueen	Consultant Microbiologist	**Roisin.Mulqueen3@hse.ie**
	Ms. Joanne King	Chief Medical Scientist	**Joannem.king@hse.ie** Phone Ext : 4575
Phlebotomy Department	Ms. Kara Burke Ms. Maureen Keane	Senior Phlebotomist Senior Phlebotomist	**KaraM.burke@hse.ie** Phone Ext : 2393 **Maureena.keane@hse.ie** Phone Ext : 2393
Laboratory Manager	**Not appointed**	**Not appointed**	**Phone Ext : 2799**
Laboratory IT Manager	Ms. Nuala NiChadhain	IT Manager	Nuala.NiChadhain@hse.ie Phone Ext 2644
Specimen Reception	Ms. Kasia Magga	Central Reception Manager	labstores.uchg@hse.ie Phone Ext : 4377
GP Requisition for Laboratory Supplies	Cruinn Diagnostics Ltd.		orders@cruinn.ie Phone : 01 629 7400 Fax : 01 6297401

Laboratory	Name		Contact
Mortuary	Mr. Joseph O'Neill	Senior Mortuary Technician	Mortuary.GUH@hse.ie Phone Ext : 4412

2.4 Population Served

Laboratory Medicine services at GUH are open to hospital clinicians and GP's in Galway, Mayo and Roscommon to meet the needs of the population. Patients from other regions of the country who are referred for tertiary treatments can also avail of these services through referral by their medical attendants. Specialist Mycobacterium laboratory service is also extended to Sligo and Letterkenny University Hospitals and National Reference Laboratory Services are provided for some bacterial pathogens.

2.5 Laboratory Opening Hours

Routine samples arriving after the stated deadlines will be processed on the next routine working day.

Department	Routine Hours	Deadline for sample in Lab
Specimen Reception	09:00 – 20:00 h	19:45 h
Blood &Tissue Establishment	08:00 – 20:00 h Mon–Fri 10:00 – 13:00 h Sat	16:00 h 11:30 h
Clinical Biochemistry	08:00 – 20:00 h Mon-Fri 10:00 – 13:00 h Sat	17:00 h Mon-Fri 12:30 h Sat
Clinical Immunology	08:00 – 17:00 h Mon-Fri	16:00 h
Anatomic Pathology	08:00 – 18:00 h Mon-Fri 09:00 - 12:30 h Sat	16:00 h Mon-Fri 11:30 h Sat
Haematology	08:00 – 20:00 h Mon-Fri 10:00 – 13:00 h Sat	17:00 h for GUH samples 16:30 h for all others 12:30 h Sat
Medical Microbiology	08:00 – 20:00 h Mon-Fri 09:30 – 12:30 h Sat	16:30 h Mon-Fri 12:00 h Sat
Virology	08:00 – 17:00 h Mon-Fri	16:00 h Mon-Fri

An on-call system operates outside normal hours for emergency work i.e. non-deferrable tests necessary for decisions regarding patient treatment. Refer to the "On-Call/Emergency Service" section of this manual.

2.6 Confidentiality Policy

It is the responsibility of all staff, as defined in their contract of employment to ensure that all information which they have access to as part of their work is treated in the strictest confidence and protected from, unauthorised access. All Staff are asked to sign a confidentiality agreement during their laboratory induction programme.

2.7 Data Protection

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

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

2.8 Complaints

Consumer Affairs and the National Advocacy Unit, Quality and Patient Safety Directorate have responsibility for developing and implementing best practice models of customer care within the HSE and promotes service user involvement across the organisation through the concept of **'Your Service Your Say'.**
Feedback, including complaints is open to patients and laboratory users throughout the "Your Service Your Say" mechanism accessible on the HSE website.
Complaints are processed in accordance with the HSE policy- Your Service Your Say – management of service user feedback for comments, compliments and complaints- publicly accessible on the HSE site.

Complaints/compliments may be received verbally, by letter, fax or email.

Alternatively the complainant may:

- Complete the HSE feedback form titled 'your service your say'
- Email: yoursay@hse.ie
- Contact HSE your service your say contact number: 1800 424 555

A complaint can also be made by contacting the Laboratory manager or the relevant laboratory Chief Medical scientist at the contacts given. The relevant laboratory will follow up complaints promptly as per their laboratories procedures.

Additionally the patient advocacy service provides an independent, free and confidential service (www.patientadvocacyservice.ie). It provides information and support to people who want to make a formal complaint through the relevant complaints policy about the care they have experienced in a Public Acute Hospital.

2.9 **Open Disclosure in Laboratory Medicine User Guide**

Open disclosure in the Laboratory refers to the process of transparent communication regarding any errors, incidents, or non-conformities in practices that may affect patient care or test results. In the context of ISO 15189 or ISO 17025 current version for example, standards that outlines the requirements for quality and competence in medical laboratories, open disclosure ensures accountability, fosters trust, and promotes a culture of continuous improvement. The user guide includes the following key points to ensure compliance with the relevant **Standards** and **Open Disclosure**:

1. **Clear Communication Protocols**: The Hospital and the Laboratory have, documented procedures for disclosing errors or incidents to patients, healthcare providers, and relevant authorities. This includes timely, honest, and empathetic communication.
2. **Documentation and Reporting**: Any incident is thoroughly documented, including the nature of the error, its potential impact, corrective actions, and preventative measures. This documentation is stored in accordance with the relevant Standards applicable to each laboratory for quality management systems.
3. **Staff Training**: Laboratory staff receive training on the principles of open disclosure, including how to handle difficult conversations and follow open disclosure procedures.
4. **Root Cause Analysis**: Laboratories perform a root cause analysis for any reported incident to identify contributing factors and implement corrective and preventive actions (CAPA).
5. **Patient-Centered Approach**: Open disclosure prioritises patient safety and well-being, ensuring that patients or their representatives are fully informed and supported throughout the process.

6. **Monitoring and Review**: Open disclosure practices are regularly reviewed to ensure compliance with the Standards and continuous quality improvement.

All HSE staff are subject to Open Disclosure procedure as per https://www2.healthservice.hse.ie/organisation/qps-incident-management/open-disclosure/policy-and-guidelines/). By adhering to these principles, laboratories can ensure that they meet the compliance standards set by the standards while fostering a culture of transparency and trust

2.10 **Freedom of Information**

The laboratory shall make relevant information available to a patient and any other health service provider at the request of the patient or the request of a healthcare provider acting on their behalf, via applications made under Freedom of Information Acts, as per https://www.hse.ie/eng/services/yourhealthservice/info/

3. Use of the Laboratory

3.1 Register of Users

All GPs who wish to submit specimens for analysis to the Laboratory must be included on the Medical Laboratory Directorate register of users. All GPs must obtain, complete and submit a User Registration form. Please ensure that the laboratory is kept updated of any changes to your contact details.

Forms can be obtained by contacting**:**

Pearse Timothy, Pathology Accounts, Laboratory Medicine Department, Galway University Hospitals, Galway

Email: Pearse.Timothy@hse.ie

Phone: 091 544428

Communication Policy is via email therefore it is essential that we have all service users most up to date contact details and email addresses.

As the laboratory now provides an 08:00 – 20:00 h service we require contact details for all users during this time period in order to ensure that critical results can be communicated urgently as per the National Laboratory Handbook "Communication of Critical Results for Patients in the Community".

3.2 Requests to the Laboratory

The provision of legible and appropriate clinical details on the request form, together with a properly collected specimen, allows the Laboratory to issue relevant and accurate results and to assist the clinician in the interpretation of these results in the clinical context. Laboratory staff should be consulted where uncertainty exists about the availability, appropriateness, or selection of tests or the nature of the specimen required. Clinical interpretation of results is available from the clinical staff as identified in the contact information in this manual. In order to ensure compliance with patient safety and accreditation requirements, requests not complying with the specimen and form acceptance criteria, outlined below will be rejected. In certain exceptional circumstances e.g., irretrievable samples, such requests may be processed.

Request Form and Sample Acceptance Criteria

PLEASE NOTE: the below details do not apply to the **Blood and Tissue Establishments** Request Form and Sample Acceptance Criteria since their role is different and compliance here is for issue of Blood and Tissue products as well as associated tests. Please refer to Section 7 for details in relation to this Establishments rules and requirements in this area.

All request forms and specimens must be submitted as follows:

Hospital users must use the relevant request form pertaining to the request. The main in-house request form is LMDHRF 001, please note there are other forms for specialised samples e.g. cross-matching, Histology/Cytology samples.

The Laboratory Emergency Request form should be used for urgent requests ONLY. (LMDERF 001)

GPs' must use standard GP request forms. (LMDGPRF 001)

The medical practitioner signing the request form is responsible for ensuring that the test request is appropriate and that issues of consent to testing and privacy have been dealt with appropriately

All sites external to GUH and Merlin Park should order specimen containers via Cruinn using their specific order form. A few items may still be sourced in house in GUH Laboratories and communication has been released on these items. Internally GUH and Merlin Park, users can obtain their supply from the GUH Laboratories.

The laboratory expects the requesting Doctors/Phlebotomists who opt to use printed labels to have safe procedures in place for controlling and printing, affixing and checking patient details of such labels.

Please note separate forms and samples must be used when submitting requests for **multiple departments**.

Specimen Request Form

It is essential and of utmost importance that patient's location and clinician are noted on each request form. This applies to Hospital and GP forms. It is imperative the laboratory departments receive same to allow easy and immediate transmission of results.

The patient identification section of the request form must be completed in detail.

Please note that the **Board Number** is the primary identifier that should be documented on the request form to ensure the correct identification of the patient, this will enable the laboratory to promptly process and transmit critical results.

Note: **PID** number (patient identifier) is interchangeable with Board Number (BN).

Hospital Users: Please use the patient's full name, forename (no initials, abbreviations etc.) and surname, date of birth, board number, address, responsible clinician and patients' location.

GP users: Please use the patient's full name, forename (no initials, abbreviations etc.) and surname, date of birth, address and the doctors' name and surgery. GP users are requested to provide the 'Hospital Board Number' (BN) applicable to the patient on the request if available.

If you are using an addressograph system please fix the label to the patient identification section of the form. If hand written, you must use block capitals. If the addressograph label includes information such as Doctors name and surgery, collection time/date and test required this information must also be written in the appropriate section of the form. The information on the specimen must correspond to that on the request form. If using addressograph labels on specimens please ensure that the label fits the specimen tube. Oversized labels cause specimens to get stuck on automated instruments and will lead to sample processing delays. The request form must include appropriate patient information, including specimen type, specimen site, medications and transfusion history where relevant. It is advised to label all specimens in the presence of the patient so that they can confirm correct identification. If this is not feasible, such as in a surgical setting where the patient is unconscious, a means of confirming the identity of the patient from whom the sample is collected must be in place and followed. Any difficulty in obtaining the specimen should be noted on the request form. In the case of short or scanty specimens list tests requested in order of priority.

Histopathology requirement: The specimen site must be indicated and detailed on the request form and the container.

In the case of multipart container submission on a case each part must be clearly identified as to the site and nature of the specimen. The detail on the request form and the specimen container must match**.** SHARPS containers must not be used as specimen containers. Ensure that the lid is securely closed on the container to prevent spillage.

Patient demographics on the request form must be legible, consistent and must match the information on the specimen container. Multiple samples on one form are acceptable and should be labelled A, B, C etc. where possible. Use addressograph labels or print the information giving the following details:

- The patient's full forename and surname.
- The patient's date of birth DD/MM/YY. (Ensure a consistent date of birth).
- Board Number if available for GP requests.
- Patient's gender.
- Home address of patient (state change of home address where applicable).
- Consultant' name and location/GP' name, address and telephone number.

Locum doctors must give practice doctors name and address.

- The name and address of the doctor to whom the result should be communicated if different from the requesting doctor.
- Signature of the requesting doctor (must be legible).
- The name of person who collected the specimen.
- The required analysis.
- Clinical details.
- Date and time of sample collection, nature and site of specimen.
- Where the clinician is submitting slides to the DAP for analysis that the number of slides being submitted should be recorded on the request form.

Specimen Container
All specimen containers must be legibly labelled with patient's full forename, surname, date of birth, (Board Number if available), date and time of specimen collection and the signature of the person who collected the specimen.

If using addressograph labels these must be no larger than the specimen label on the container. Place the identification label over the container label so that horizontal visual inspection of the sample is not impeded. Addressograph labels must have all relevant details. Data on the addressograph label must not be modified. Sample fill line must remain visible on all coagulation/INR tubes. The Blood and Tissue Establishment do not accept addressograph labels on sample containers. The person who performs the phlebotomy must write their initials on the container.

In the case of timed urine collections state the start and finishing times. If submitting an aliquot, state the timed urine volume.

At Phlebotomy, the following order-of-draw is recommended when drawing multiple specimens to avoid cross contamination from tube additives.

Blood Culture
Coagulation Tube
Serum Tube
Heparin Tube
EDTA Tube
Blood Glucose Tube

All specimens must state the nature and the site of the specimen, as well as patient identification.

Specimens should be submitted in supplied Specibags or Biohazard bags that allow separation of sample and request form. All specimens delivered to the Laboratory including postal specimens must conform to UN packaging and transportation guidelines.

Histopathology requirement:

- **For fixed specimens, ensure the specimen container selected is large enough to allow the specimen to be immersed in at least twice its own volume of buffered formalin.**
- **The specimen site must be indicated and detailed on the request form and on the container.**
- In the case of multipart container submission on a case each part must be clearly identified as to the site and nature of the specimen. The detail on the request form and the specimen container must match.
- **The lid must be securely closed to prevent spillage**.
- **Radioactive specimens:** The Request Form and specimen containers must have a radiation label. When a radioactive specimen is being sent information on the radiation dose should be given. The specimen should be

delivered to the dedicated lab room for radioactive specimens. It should be placed behind the lead shield, and the lab staff informed of its presence there.

- The Request Form and specimen containers must indicate if specimen is high risk (i.e. TB, COVID-19, HIV or Hepatitis).
- The Colorectal Programme specimen request form must include the NCSS COR number.
- SHARPS containers must **not** be used as specimen containers.

Note: It is not possible or safe at the moment of receipt of the specimen(s) in the Division of Anatomic Pathology to check each pot for the presence of a specimen. Therefore acceptance of a test request by the DAP staff is not confirmation that the described specimen is present in the container, but rather that the form details and the container details, and where applicable the sign off book details, match and contain the information required. The absence of a described specimen may not be noted until the specimen container is opened in the sampling area of the lab. The absence of a described specimen is recorded as a non-conformance. The sender is informed of the issue as soon as possible by the DAP staff.

3.3 Supplies of Request Forms and Specimen Containers

All sites external to GUH and Merlin Park should order request forms and specimen containers via Cruinn using their specific order form. A few items may still be sourced in house in GUH Laboratories and communication has been released on these items. Internally GUH and Merlin Park, users can obtain their supply from the GUH Laboratories. In the event of a patient requiring a 24 hour urine container from the laboratory the requesting GP should inform Laboratory Stores in advance so the correct container can be prepared. Requisitions for laboratory stores from wards in GUH must be received in laboratory on Monday of each week. These will be prepared and ready for collection on the Wednesday afternoon.

Emergency supplies must be requisitioned before 11:00 h each day.

3.4 Collection of Specimens

General Guidelines

Refer to the Test Directory for a list of tests performed, the specimen required, turnaround time, reference range and other information regarding specimen collection.

Specimens for some tests must be collected with the patient fasting, or with knowledge of when food was last taken (e.g. glucose). Some tests must be collected in the basal state or with due regard to diurnal variations. Some tests may be performed only after prior arrangement with the laboratory e.g. stool parasitology, PCR assay. Where doubt exists, the appropriate laboratory should be consulted.

It is advised to label all specimens in the presence of the patient so that they can confirm correct identification. If this is not feasible, such as in a surgical setting where the patient is unconscious, a means of confirming the identity of the patient from whom the sample is collected must be in place and followed. Any difficulty in obtaining the specimen should be noted on the request form. In the case of short or scanty specimens list tests requested in order of priority.

Specimen Collection: Blood samples

Hand hygiene must be performed prior to commencement. Greet the patient and identify yourself and indicate the procedure that will take place. Positive patient identification is MANDATORY. Verify that the patient meets and requirements for the testing to be undertaken e.g. fasting status, medication status, predetermined time for specimen collection, etc.

1. Standard precautions must be observed when taking blood.
2. Disposable non-sterile latex free gloves must be worn by the phlebotomist when taking blood in all circumstances.
3. Change gloves between patients
4. Wash hands or apply an antimicrobial gel before and after each procedure and on removal of gloves.
5. When sampling blood from any patient extreme care must be taken and every patient must be considered as potentially high risk.
6. When taking blood ensure the limb is well supported, and the patient is aware to keep it still. The limb may need to be supported by an assistant to achieve this.

7. When removing a blunted needle from a limb, ensure that the vacuum bottle has been disconnected from the multi sampler area. Leaving this in situ may cause blood droplets to spray.
8. Cover the puncture site with a sterile swab or cotton wool when removing the needle to reduce the risk of blood droplets spraying into the air.
9. Avoid spillage of blood. If spillage occurs, clean spillage immediately.
10. If a sample bottle breaks, never attempt to pick it up. Avail of the nearest spillage kit and use accordingly to clean the hazardous material.
11. The user of 'sharps' is responsible for their safe and appropriate use and disposal. 'Sharps' must never be left for a colleague to tidy up.
12. Label the specimen with the appropriate patient details.
13. Place the specimen in the bag attached to the request form.
14. Take care to prevent needle stick injuries when using and disposing of needles.

Note: NEVER pour blood from one tube to another since the tubes can have different additives or coatings.

Specimen Collection: 24 h Urine Collections

Approved containers are available from the Clinical Biochemistry Laboratory. Please ensure that the identification on the container (s) includes patient's name, date of birth, board number or address and the name of requesting doctor.

Patient Instruction for a Home 24 Hour Urine Collection

- Your doctor has asked you to do a 24 hour urine collection. Please follow these instructions:
- Do not start a collection on a Friday or Saturday or the day before a bank holiday. Do not start a collection when menstruating.
- Try to ensure you keep the container cool/refrigerated throughout the collection.
- If you think you pass more than this container will allow tell your doctor or come to Specimen Reception at the University Hospital Galway Pathology Building to get a second container.
- If you start the test and don't have enough containers for the amount of urine you produce in 24 hours, discard the urine and container and start the collection again with fresh urine containers.
- If your doctor hasn't attached an addressograph label with your details to the container(s), please write your name and date of birth (D.O.B.) on the container(s). The label should also contain your doctor's name and GP surgery / clinic name.
- On the day you plan to perform the collection, on getting up in the morning, pass urine in the toilet as normal. This is considered the start time of the collection. Write the date and this time on the container label(s) as 'Date' and 'Start Time'. This is very important.
- Every urination over the following 24 hours, both during the day and night, should be passed into a clean receptacle, such as a small jug, before being poured carefully into the container(s) provided. If you have a bowel movement, you should also collect the urine passed.
- The morning urine passed at roughly the same time as the one you discarded the previous day, should be collected, so that collection is finished with your bladder empty. Write this time on the container label(s) under 'Finish Time'. This is very important.
- Please check that the cap is firmly screwed onto the container. Unfortunately, if the urine leaks in transit, the collection will be invalid and the analysis will not be carried out.
- Ensure that the bottle together with the request form you received from your doctor is submitted promptly to either your doctor or Specimen Reception at the University Hospital Galway Pathology Building.

One of the tests occasionally done on 24 hour urine collections is called 5-HIAA. If this is the test your doctor has requested, for 48 hours before you start your urine collection and during the urine collection, AVOID paracetamol, aspirin, antihistamines, cough syrups and cold and flu medications and AVOID consuming bananas, chocolate, dried fruit, citrus fruit, avocados, tomatoes, plums, kiwis, pineapples and molluscs.

Finally, many people get their collection wrong despite their best of intentions. It is better to admit this and discard an improperly collected sample than hand in a partial sample which would yield inaccurate results. Such results could affect important decisions regarding your treatment.

WARNING

Urine collection bottles may have acid added to them as a preservative. This acid should not be poured out.
The bottle will have a hazard warning sticker label on it: "Handle with extreme care", "Contains strong acid"

Extreme care should be exercised during the 24-hour collection. A clean receptacle should be used to collect the urine and pour it carefully into the plastic collection bottle TO AVOID SPLASHING OF ACID PRESERVATIVE. If there is an accidental spill of the acid on the user please follow the instruction below.

FIRST AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion: DO NOT INDUCE VOMITING. Give large quantities of water or milk, if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Random Urine Collections

Freshly voided urine collected into a universal container should be sent to the laboratory without delay. Urine specimens collected into a boric acid container are unsuitable for biochemistry analysis.

4. Phlebotomy Service

The Phlebotomy department is based in the Out-Patients Department at GUH. The service covers both GUH and MPUH**.**

Phlebotomy Service		
GUH		
Wards (Excluding Paediatrics and Psychiatry)	Mon-Friday	7:00 – 13:30
OPD	Mon – Thurs Friday	09:00 – 18:00 09:00 – 14:00
Weekend (Emergency bloods only)	Saturday - Sunday	07:00 – 12:30
Bank Holiday Arrangements	07:00 – 12:30 (excluding Christmas day)	
GP's	May refer patients for phlebotomy by prior consultation with the Senior Phlebotomist. Please ensure the appropriate request form is completed. If referring patient to Phlebotomy, it must be in line with COVID-19 guidelines i.e. patient without signs/symptoms, must present with face mask & adhere to hospital IPC protocols	
Merlin Park University Hospital		
Wards (Hospital 1, 2, SCU, Hospital Ground, Units 1, 4, 6, 8)	Mon - Friday	07:00 - completion
OPD	Monday – Thursday Friday	09:00 – 18:00 09:00 - 14:00

Requirements for Patients Attending Phlebotomy

All patients attending the Phlebotomy Service at the Galway University Hospital must present with the relevant laboratory specimen request forms completed by the requesting doctor.

The relevant specimen request form(s) and container(s) should contain the essential information as defined above. Bleep Senior Phlebotomist 735/835 for any queries.

Safe Specimen Collection and Disposal of Materials used

Dispose of all clinical waste in accordance with National Guidelines.

- Universal precautions must be adhered to at all times.
- Gloves must be worn at all times.
- Gloves must be changed after each patient.
- Needles must not be recapped after use.
- Dispose of sharps in a suitable sharps container.
- Dispose of all clinical waste into yellow bag.
- Uncontaminated gloves can be disposed of into clear plastic bag.

5. Transport of Specimens to the Laboratory

5.1 General Guidelines

The transport of specimens to the Laboratory must follow ADR (UN 3373) regulations and guidelines in order to minimise the risk of infection to those who may come in contact with the specimens e.g. taxi drivers, couriers, postal workers, porters, laboratory staff etc. Consignors of specimens must ensure that packages are prepared in such a manner as to meet the requirements for packaging and transport of biological material by road, rail or post in accordance with the ADR regulations (or any such regulations that may be effected from time to time) and in accordance with any special criteria as required by the laboratory at GUH.

For the transport of routine samples, a basic triple packaging system is recommended comprising of the following.

1. The primary watertight, leak-proof sample container.
2. A secondary, watertight leak-proof packaging with absorbent material to contain the primary sample
3. A third, outer layer of packaging to protect the sample from physical damage while in transit.

The correct specimen container and laboratory request form must always be used when sending specimens to the laboratory. It must be ensured that the container is appropriate for the purpose, is properly closed, and is not contaminated on the outside. To avoid specimen rejection, please follow the specimen requirement instructions in the test directory. If in doubt, contact the appropriate laboratory. Certain assays require transportation at specific temperatures. Specific instruction is given in the test directory section.

5.2 Internal Transport of Specimens

The transport of specimens to the laboratory from GUH or MPUH locations is by the use of the portering services or the pneumatic air tube system. The following guidelines for sending samples internally must be followed:

Specimens must be placed within the bag that is attached to the request form. This bag must then be sealed.
Specimen containers that are contaminated externally must not be sent to the laboratory.

When sending several samples to the laboratory special sealable plastic bags should be used in conjunction with the appropriate secondary specimen transportation container/box. The secondary containers' currently used throughout the hospital are the 7 litre and 30 litre from Daniels Healthcare.

Blood gas specimens must never be sent to the laboratory with the needle attached.

Under no circumstances should anyone transport the primary specimen container in one's hand or pocket.

Unfixed histopathology specimens are brought directly to the histopathology Laboratory and handed to a staff member.

Delivery of urgent unfixed specimens must be pre-arranged with the Histopathology laboratory.

Samples for CSF by flow cytometry must be delivered to the laboratory immediately post sampling.

Methaemoglobin must be delivered immediately to the Haematology lab for testing within the one hour requirement.

Radioactive specimens for the Histopathology laboratory should be delivered to the dedicated radiation area in the Histopathology lab cutup, placed behind the lead lined shield, and lab staff informed of its presence there.

5.3 Portering Schedules

GUH
Laboratory specimens are collected from wards and the blood room at 09:00 h and 13:30 h each weekday. Saturday collection is between 08:00 h and 09:00 h. Ideally, specimens should be taken to coincide with collection times. The collection of urgent or out-of-hours specimens must be organised at ward level by paging the porter on duty.

Histopathology specimens are brought directly to the Histopathology Laboratory from theatres and wards between 09.00 h and 17.00 h. Delivery of urgent unfixed specimens must be pre-arranged with the Histopathology laboratory.

MPUH
There is an hourly transportation of specimens from Merlin Park University Hospital to the Laboratory Medicine department on the half hour each day from 07:30 h to 16:30 h. Between 17:00 h and 20:00 h there are two deliveries depending on demand. From 20:00 h to 08:00 h the night porter in response to demand collects and delivers all urgent specimens.

5.4 Pneumatic Tube System Transport

The Pneumatic Tube System (P.T.S.) commonly referred to as the 'Chute' is used mainly for the sending of specimens to some of the Laboratory Departments. However it may also be used for the sending of many other items between stations limited only by size and safety considerations.

Before using the 'Chute', please familiarise yourself with the correct operation and health & safety procedures. Please be aware of the specimen types that can and cannot be transported using the 'Chute' including the carrier (shuttle) colour and type.

To send a sample:

Place the sample in a Biohazard bag and seal the sample packet.

Place the request form in the Biohazard bag open pocket.

If using 'Speci-bags' seal by removing the strip and folding the bag onto the sticky surface.

Place the bag in the correct carrier type. Do not overload.

Dial the station address number and without delay place carrier on the station for dispatch.

Check for any messages on the station.

Transportable items and carrier type:

Red carrier: Blood samples, Urine sample, Stool samples, Culture swabs, Laboratory request form

Protected glass slides, Store requests, Laboratory reports, Small store items

Yellow carrier: Pharmacy requests

Blue carrier: Fluid samples

Non-transportable items:

Bone Marrow samples, Blood culture samples in glass bottles (mycolytic bottles), Blood products, C.S.F samples, Fresh tissue samples, sweat samples.

Blood Gases, P.C.R. samples, Platelet Aggregations, Frozen sections, Radioactive substances, Stem Cell Collections, Units of blood, Histopathology/Cytopathology specimens, Platelet Function Tests and any item which may break or leak in the system.

Unattended stations:
Anatomic Pathology: there is no chute facility to deliver specimens to the Anatomic Pathology and it is unsafe to attempt to do so and is not recommended.

Clinical Immunology: stations are programmed to shut down when the respective departments are closed i.e. overnight, weekends and holiday periods. Check with individual departments for times.

5.5 General Practice, Primary Care and HSE Hospitals

All GMS participating GP's in County Galway have access to collections from designated locations by WestDoc Logistics under a Primary Care arrangement.

For hospitals in theWest North West region or GP's outside of Galway contact the Laboratory Manager for details.

Specimens should ideally be sent to the laboratory as soon as possible (via the next transport on the same day as collection). If samples cannot be sent to the laboratory on the day of collection (e.g. venepuncture performed after last pick up), it is important to be aware of sample specific storage guidelines i.e. refrigeration vs Room temperature etc.

If patient samples and materials are to be stored they should be stored in conditions that ensure the continuing integrity samples and in a manner that prevents cross contamination and deterioration. For queries related to sample storage refer to Section 16 or contact the relevant laboratory.

Additionally it is important that when samples are transported from primary or secondary care that they are kept within the specified temperature range and are compliant with ADR regulations.

If GP is organising a Taxi\GP Practice staff member drop off, GPs are to ensure samples transported to the Laboratory are in line with prevailing ADR transport regulations.

Guidelines for Sample Centrifugation

Please contact the laboratory for information on the correct procedure for centrifugation and ensure that manufacturer's guidelines for safe use are adhered to.

5.6 BreastCheck Unit

Specimens from the BreastCheck unit for the Division of Anatomic Pathology are delivered directly to DAP specimen reception by BreastCheck staff.

5.7 Community Hub Clinics

This information is for use by the community hub clinics and other primary care clinics to provide information regarding stability and best practice for blood and urine sample storage.

Sending Samples to the Laboratory

1. Specimens should ideally be sent to the laboratory as soon as possible (via the next transport on the day of sample collection).

2. If samples cannot be sent to the laboratory on the day of collection (e.g. venepuncture performed after the last courier pick-up):

   Biochemistry samples
   - **Biochemistry samples** (serum gel or lithium heparin with gel) should be centrifuged and ideally stored refrigerated in a tube rack (2-8°C)
   - **Biochemistry samples** (fluoride oxalate) should **not** be centrifuged; these should be stored refrigerated (2-8°C)
     Note EDTA specimens for HBA1c must not be centrifuged and can be stored at room temperature until courier collection the next day
   - **Urine samples** (random 'spot' and 24-hour samples) should be stored refrigerated (2-8°C)

   Haematology samples
   - **EDTA** samples for Full Blood Counts should **not** be centrifuged. These samples should ideally be stored refrigerated (2-8°C).
   - **Citrate samples** should **not** be centrifuged and **must** be stored at room temperature. One day old citrate samples are suitable for INR only and are **not** suitable for coagulation screen. Coagulation screen requests **must** be received in the laboratory on the same day as sample collection.
   - **Haematinic samples** (B12, Folate and Ferritin- serum gel) must be centrifuged and stored refrigerated in a tube rack (2-8°C).

Immunology samples

Serum gel specimens (for example Allergy or Autoimmunity screens) should be centrifuged and ideally stored refrigerated in a tube rack (2-8°C).

Refer to Section 16 test directory for requirements for other specimen types and individual test requirements:

- **EDTA specimens** for Haemachromatosis, Genetics or Flow Cytometry **MUST** not be centrifuged and **MUST** be stored at room temperature until courier collection the next day.
- Interferon Gamma Release Assay (IGRA/Quantiferon) specimen tubes **–** Refer to Section 11.12
-

Microbiology samples

Sputum samples stored refrigerated (2-8°C) until courier pick up next morning

Virology samples

On occasion where overnight storage is required, serum gel whether centrifuged or not, should ideally be stored refrigerated (4-8°C).

Note:

8 ml K2E K2EDTA separator specimens for Viral Load testing must be received in the laboratory within 24 hours post venepuncture **and** after discussion with laboratory staff. Samples received > 24 hours are not processed. Telephone to discuss if required.

3. **Do not freeze blood samples** unless specifically advised by the laboratory to do so. These samples should be sent to the laboratory the next morning. They need to reach the laboratory within 24 hours of being taken.
4. Please note: samples should ideally not be taken on Fridays after the last courier pick- up as these samples will only reach the laboratory the next Monday.

For more information, please contact the relevant laboratory or refer to their respective departmental websites/ sections of this laboratory user guide.

6. Reporting Results

6.1 iLAB

The iLAB laboratory information system (APEX) is a single integrated system operating across all laboratory disciplines in GUH, MUH, PUH and RUH. A demographic interface exists between the Integrated Patient Management System or IPMS and the LIS. This interface reduces the requirement for data re-entry in the laboratory, and stringent protocols for the management of data quality enhance the integrity and consistency of the patient record in the LIS database.

Results for hospital inpatients are available to the wards under two routes.

The main route to access patients lab results is EVOLVE, which replaces the Ward enquiry function previously available on PAS, which is no longer available with IPMS.
The second route is via a Web Lab Ward Enquiry function or APEX, the logon icon for both is located in the GUH Useful Resources folder on the PC Desktop. To use WebLab/APEX the user must contact the LIS Manager for a Username and Password. Histology results may ONLY be viewed using APEX.

Because the same incidence of APEX is used in GUH, MUH and RUH, results from these three locations are displayed together. Results may extend to more than one visible page. Ward users must have a Board Number or a Chart Number to look up inpatient results. It is possible to audit what Users have accessed any particular result/patient record whether accessed through Evolve or directly through WebLab/APEX. Generic logons/sharing of passwords is not permitted.

6.2 HealthLinks

HealthLinks is the name given to the Department of Health funded project which allows electronic links to be established between General Practitioners, Hospitals and the Health Service Executive to allow for the timely and secure transfer of patient related administration, clinical data and laboratory reports. For further information on HealthLink Contact: support.healthlink@healthmail.ie

For those who are using HealthLink messaging, it is vital to regularly check reports imported into your PMS with reports on the HealthLink website. This is to ensure that results, reference ranges, demographics etc are being transferred correctly from the laboratory to your PMS.

It is the responsibility of the practice to ensure your software system mapping is correct.

If you have any problems with any aspect of GP messaging, your first point of contact is your PMS software provider or HealthLink (01 - 828 7115, support.healthlink@healthmail.ie)

6.3 Clinical Information Systems

Interfaces have been established with CIS in ICU (Metavision), RIS in Radiotherapy (Lantis) and Diabetic Day Unit (Diamond) and eMED renal system. This allows for rapid electronic downloading of patient reports from a number of laboratory departments to the patient bedside and clinical areas.

6.4 Printed Reports

Printed reports are not issued for all samples as in many circumstances electronic delivery is faster and supports ready access in multiple patient care areas within the hospital group. (Note: A printed report is issued for all Division of Anatomic Pathology reports. DAP reports are not available via HealthLinks). Reports are printed with reference ranges and / or suitable comments wherever appropriate, to aid interpretation of results. Reports are provided only to the submitter except in exceptional circumstances where senior staff are satisfied that an exception is necessary in the patient's interest. Reports are not provided directly to patients. Reports are printed daily. Printed reports are delivered by the portering staff to GUH wards. General practitioners reports are posted daily.

External hospital reports are printed and issued as follows:

Mayo University Hospital	Reports collected daily
Roscommon University Hospital	Reports posted daily
Sligo University Hospital	Reports posted daily
Limerick University Hospital Limerick	Reports posted daily
Portiuncula University Hospital	Reports posted daily
Ennis General Hospital	Reports posted daily
Letterkenny University Hospital	Reports posted daily
Galway Clinic	Reports collected daily
Bons Secours Hospital	Reports collected daily

7. Blood and Tissue Establishment

7.1 Department Profile

Galway Blood & Tissue Establishment (GBTE) is fully licensed by the Health Products Regulatory Authority (HPRA, formerly Irish Medicines Board) and holds three licences: a Blood Licence, a Tissue Licence and a Good Manufacturing Practice (GMP) Licence. GBTE is also accredited to ISO 15189 by the Irish National Accreditation Board (INAB). GBTE also has a Calibration Department INAB Accredited to ISO 17025.
Blood, blood components and blood products are issued by GBTE for patients throughout Galway University Hospitals (GUH).
GBTE provides an ante-natal serology screening service for GPs, Consultants in private practice and the ante-natal clinic Mayo University Hospital, Castlebar.
Blood is also supplied by GBTE to the Galway Hospice, Roscommon University Hospital and the Bons Secours Hospital. In emergency situations blood is supplied to Portiuncula University Hospital, Mayo University Hospital, Castlebar, the Galway Clinic and any other hospital which require assistance.
Autologous and Allogeneic Serum Eye Drops (ASE's), Stem Cell Collections, CAR-T service, supply of Bone and Bone Products such as tendons, bone chips, meniscus as well as Occular tissues such as corneas, amnion membrane and sclera are services which are co-ordinated from GBTE. Irradiation of Red Cells is carried out on-site in the GBTE.

7.2 Services and Products available at GBTE

GBTE stock the following blood components/products:

- Red Cells
- LG Plasma
- Platelets
- Fibrinogen
- Albumin 20% and Albumin 5%
- Anti D Immunoglobulin
- Factor Concentrates (human & recombinant) factor VIIa, factor VIII, factor VIII/ human von Willebrands factor, recombinant vWF factor IX, Prothrombin Complex Concentrate (PCC)
- Human Hemin
- Hepatitis B & Varicella Immunoglobulins
- C1 esterase inhibitor
- Activated PCC

The above are issued upon receipt of a completed Blood/Blood Product Request form. Products must also be prescribed on the "Blood & Blood Product Prescription & Transfusion Record", BPTR (pink document) at ward level.

RAADP Routine antenatal anti-D prophylaxis (RAADP) is given by injection to pregnant women who are RhD-negative usually at week 28 of their pregnancy. After the birth, a blood sample will be taken to test the baby's blood group. If the baby is RhD positive, a mother who is RhD negative will be given a further injection of anti-D immunoglobulin - this is known as postnatal anti-D prophylaxis. If an RhD-negative woman has a potentially sensitising event DURING THE pregnancy she will be offered anti-D prophylaxis at the time of the event: this is known as antenatal anti-D prophylaxis or AADP. Please contact the Maternity department for more information.
cfDNA testing of the mother's blood can also be completed in early pregnancy. This is performed in a referral site (generally the IBTS). It predicts the fetus blood group and women who have a predicted Rh Negative fetus then do not enter the RAADP program for prophylactic Anti-D. The infants' blood group is then confirmed at birth.

7.3 Sample / Request Form Labelling Policy

Test/Product	Availability	Specimen Type	Comment
Albumin	Routine & Urgent	None	
Anti-D Immunoglobulin	Routine & Urgent	6 ml EDTA blood	

Test/Product	Availability	Specimen Type	Comment
Anti-Neutrophil Antibodies	On Request	6 ml blood in plain gel tube	Referred to IBGRL Please state reason for request
Anti-Varicella Ig	Routine & Urgent	None	
Autologous & Allogeneic Serum Eye Drops	Contact Blood and Tissue Establishment to arrange		
Coagulation Factor Concentrates	Routine & Urgent	None	Discuss with Haematology team Exception: Anaesthetics
Cold Agglutinin Screen	Routine	6 ml EDTA blood	Deliver sample to lab at 37°. Contact GBTE for instructions prior to sampling
Direct Coombs Test	Routine & Urgent	6 ml EDTA blood	
Group & Antibody Screen (Ante-natal)	Routine & Urgent	6 ml EDTA blood	
Group & Hold / Group & Cross match	Routine & Urgent	Adults - 6 ml EDTA blood Paeds – 4 ml EDTA blood	CMV / Irradiated blood must be requested by the Clinician, if required.
Hepatitis B Ig	Routine & Urgent	None	
HLA Antibodies	On Request	6 ml EDTA blood	Referred to Irish Blood Transfusion Service (IBTS request form is available on Claddagh/Corrib, Oncology and Haematology Day Wards).
HLA Typing for transplants	On Request	6 ml EDTA blood	
HLA & Disease Association	On Request	5-10 ml EDTA blood	
HLA Class I typing for HLA matched platelets	On Request	5-10 ml EDTA blood	
Human Platelet Antigen Typing	On Request	5 ml EDTA blood	
Orthopaedic and Occular products	Contact Blood and Tissue Establishment to arrange		
Peripheral Blood Stem Cell Harvest CAR-T treatment	Contact Blood and Tissue Establishment to arrange Contact the CAR-T co-ordinator to arrange.		
Platelet Antibodies	On Request	5-10ml blood in a plain gel tube	Referred to Irish Blood Transfusion Service (IBTS request form is available on Claddagh/Corrib, Oncology and Haematology Day Wards).
Platelet Refractoriness	On Request	10 ml blood in a plain gel tube & 5-10 ml EDTA Blood	
Plasma (LG Octaplas &)	Routine & Urgent	6 ml EDTA blood - if group unknown	Telephone request followed by written request
Platelets	Routine & Urgent	6 ml EDTA blood - if group unknown	Telephone request in advance, followed by written request.
Post Transfusion Purpura	On Request	5-10 ml blood in a plain gel tube & 5ml EDTA blood	Refer to IBTS. Please state reason for request
RAADP	By request	6 ml EDTA blood	Please contact the Maternity department for more information.
cfDNA	On Request	2 x 6ml EDTA blood	Referred to Irish Blood Transfusion Service
Testing for NAITP	On Request	10-20 ml blood in a plain gel tube & 5 ml EDTA blood (mother) 1 ml EDTA blood (neonate) 5 ml EDTA blood (father)	Referred to Irish Blood Transfusion Service (IBTS request form is available on Claddagh/Corrib, Oncology and Haematology Day Wards).

Test/Product	Availability	Specimen Type	Comment
Transfusion Reaction Investigation	By Request	6 ml EDTA blood	Phone Blood Bank with details and request a Transfusion Reaction Pack. Return all units to GBTE. Complete the Transfusion Reaction form and inform TSO.
Transfusion Related Acute Lung Injury (TRALI)	By Request	20 ml blood in a plain gel tube & 5 ml EDTA blood	Referred to IBTS. Please state reason for request
Zygosity Testing	By Request	6 ml EDTA blood	Referred to IBTS. Please indicate reason for request

Tests that are not completed on-site are recorded and referred to external laboratories for testing. Please contact GBTE for external request forms or any queries regarding specimen refer.

Reference: https://www.giveblood.ie/Old-Site-Documents/NHIRL-Customer-Handbook-pdf.pdf for details of sample/request form labelling policy in referral site.

Specimen Labelling Requirements for Group & Hold / Crossmatch
Please ensure prior to taking sample that the expiry date on the sample tube is in date, otherwise the sample will be rejected
Minimum and Maximum Sample Volume for Paediatric / Neonatal patients.
The minimum volume for a Neonatal / Paediatric specimen is 1ml. If you are unable to obtain 1ml on a Paediatric / Neonatal specimen then you must contact the GBTE to discuss and the laboratory will further advise.

The optimum sample volume for Neonatal / Paediatric specimens is 2ml. Please refrain from taking more than this amount in this patient cohort (cord bloods accepted).

Minimum and Maximum Sample Volume for Adult patients
The minimum volume for an Adult patient is as follows:

- Hospital, GP and Ante Natal specimens - minimum 2ml, maximum / optimal is to the fill line
    - If a patient has a complex serology the GBTE minimum volume is to the fill line and GBTE staff will advise if additional samples are required.
- Referrals – contact the GBTE for the minimum and maximum volumes required

Specimen Labelling Requirements for Group & Hold / Crossmatch
Please ensure prior to taking sample that the expiry date on the sample tube is in date, otherwise the sample will be rejected
All routine crossmatch samples must be received in GBTE before 16:00h.
A Group and Hold sample lasts 72 hours from time taken.
Blood Track PDA labels are accepted on all samples. The PDA label may also be used in place of the sample taker signature on samples from the Bon Secours, RUH, Mayo ANC and Mayo Pre-assessment clinics.

The following legible information must be recorded on the specimen (Handwritten or Bloodtrack label is only accepted):

- Patients full first name and surname. (Patients second names or maiden names should be used where relevant). Unnamed new-borns should be labelled with Male / Female infant of [Surname].
- Board Number or Bon Secours (G) Number
- Date of Birth
- Patient gender
- Signature of the person taking the specimen
- Date and time of specimen collection
- Patient location.
- Patients name, board number, DOB and gender are the minimum requirements to ensure positive patient identification.

Requests Form Requirements for Group & Hold / Crossmatch
A fully completed request form (RL32), Ante-Natal form (BGF) must accompany the specimen.
An addressograph or bloodtrack label, is acceptable on the form provided the details are accurate and correct. If using an addressograph label ensure the location and patient's Consultant is recorded on it or on the specific section of the request form.

The decision to crossmatch and prescribe blood for a patient is the responsibility of the clinician. This should be recorded in the patient's medical notes. The patient's current haemoglobin level must be checked prior to making the decision to transfuse. If the original request on the patient was a Group and Screen only, the request for Blood / Blood products must be sent on a separate Blood and Tissue RL32 form and this will be attached to the original form in the GBTE.

- For thresholds for Red Cell Transfusion see CLN HVIG 035, Appendix 1, available on Q-Pulse.
- For thresholds for Platelet Transfusion see CLN HVIG 036 Appendix 1, available on Q-Pulse.

The following legible information must be recorded on the specimen request form.

- Patients full first name and surname Unnamed new-borns should be labelled with Male / Female infant of [Surname]
- Board Number or Bon Secours (G) number. Patients DOB.
- Patient gender.
- Patient location.
- Patients' consultant.
- Name and signature of the person taking the specimen.
- Name, bleep and signature of the person requesting the test(s) / products.
- Date and time of specimen collection.
- The tests required / products (including volume / amount) requested should be clearly stated.
- Special Requirements for blood / blood products (if applicable).
- Date and time tests / products required (if applicable).
- Patient clinical details including diagnosis and / or indication for transfusion if relevant.
- Transfusion history (including details of blood group / previous transfusions / reactions / marrow or other transplants if relevant).
- Patient Diagnosis.
- Other information deemed relevant to the GBTE.

Requests for blood components / products may be completed retrospectively in emergency situations.
Patients name, board number, DOB and gender are the minimum requirements to ensure positive patient identification.
Send sample and form directly to the Blood and Tissue Establishment.
Information on patient's Hospital ID band, request form and blood sample must be identical.

Specimen Labelling Requirements for Antenatals/Miscellaneous Tests
Specimens submitted to the GBTE for Group and / or screen and miscellaneous tests (e.g. Neonatal Group and Coombs, Coombs Tests, Cold Agglutinin Investigations, Pre-assessment Group and Antibody Investigations, Transfusion Reaction Investigations).
The following legible information must be recorded on the specimen (Handwritten or Bloodtrack label is only accepted):

- Patients full first name and surname. Unnamed new-borns should be labelled with Male / Female infant of [Surname].
- Board Number or Bon Secours (G) Number (Patients address if hospital no. unknown).*
- Date of Birth
- Patient gender
- Signature of the person taking the specimen
- Date and time of specimen collection
- Patient location.

Patients name, board number, DOB and gender are the minimum requirements to ensure positive patient identification.
Patients Address may be used for antenatal / homebirth requests where the board no is not known.*

Request Form Requirements for Blood Group & Screen / Antenatals / Miscellaneous Tests
A fully completed blood group investigation form (BGF) must accompany the specimen.
The blood / blood product request form should accompany all other requests.
All request forms submitted to Blood Establishment for antenatal screening or miscellaneous tests must be labelled with the following details:
Patients' full first name and surname. Unnamed new-borns should be labelled with Male/ Female infant of [Surname].
Board Number or Bon Secours (G) number.

- Patients Address (where hospital no. is not known).
- Patients DOB.
- Patient gender.
- Patient location.
- Patients' consultant or GP.
- Obstetric / Transfusion history (for antenatal requests).
- Name and signature of the person taking the specimen.
- Date and time of specimen collection.
- The department / location to where the report should be referred.
- Other information deemed relevant to the GBTE.

For further information and instructions for the collection and handling of primary samples:
Refer to Clinical Policy on Q-Pulse- CLIN HVIG 06-"Request for Group and Antibody Screen, Group and Hold and Group and Crossmatch".

For Identification of the Primary Sample: Refer to Clinical Policy on Q-Pulse -CLIN HVIG 01 –"Positive Patient Identification".

Specimens must be received in GBTE within 48 h of sample collection time. Specimens received after this time require confirmation as to storage temperature (2°C – 8°C) by an ISO 15189 accredited facility. Specimens received after 72 h of sample collection time are rejected. Specimens are only available for compatibility testing for 72 h post specimen collection time after this time another specimen is required.

7.4 Unsuitable Specimens and Additional Specimens

In the event of a specimen being unsuitable for processing or where there is an analytical failure, a new sample will be requested by phone, in writing or electronically through the LIS.

In an emergency whereby the sample / request form does not conform to the labelling criteria of GBTE, a policy is in place for the sample taker to correct or amend the primary sample within certain parameters. When this occurs the individual correcting the sample must complete and sign the Incident Report Form re-Specimen/Request Form Amendments GBTE/MISC/F011 and accept responsibility for the changes to the primary sample/request.

The clinician may be requested on occasions to provide a repeat or additional sample to the Blood and Tissue Establishment when
1) Additional tests are warranted to complete investigations e.g. antibody investigations.
or
2) If there is no transfusion history on the Laboratory Information system and a crossmatch is requested. In such cases the requesting clinician/ward will be contacted by scientific staff of GBTE to request the sample.

7.5 Unidentified Patients

Where the identity of the patient is unknown, 'Male Unknown' or 'Female Unknown' is handwritten on the request form and the sample tube. The board number is recorded on the specimen and request form. The date of birth is recorded as 'Unknown' but an alias date of birth i.e. the 01/01/1881 may be used. All other requirements for routine sample labelling must be completed as per below.

7.6 Urgent Requests Policy

Please contact GBTE to indicate the nature of the emergency. During out of hours service contact the scientist via the hospital switch board (Sun-Thurs 12 MN – 8 AM / Fri-Sat 12 MN-10 AM). All emergency samples will be processed on receipt and will be prioritised according to clinical urgency provided there are no technical complications (mislabelled specimen, patient has antibodies). Uncrossmatched Emergency O Rh D Negative blood is available immediately if required.

7.7 Requests for Uncrossmatched Blood (Group O Rhesus Neg blood)

Requests for uncrossmatched blood must be made by a Clinician. A sample for Group and Cross-Match should be taken before transfusion of uncrossmatched blood if possible. Where a patient requires a blood transfusion urgently and no cross-matched blood is available for that patient, Group O Rhesus Negative blood is administered.

O Rhesus Neg. Emergency blood is available at all times from the Blood Establishment. Four units are available in the blood satellite fridge in maternity gynae theatre, 2 units are available in the Theatre satellite fridge on second floor of GUH and a further 2 units are available in the blood fridge on 2nd floor in Orthopaedic block, MPUH. GBTE must be informed immediately if emergency blood has been taken from the satellite fridges so that it can be replaced. The responsibility of transfusing uncrossmatched blood lies with the requesting clinician.

The GUH Maternity satellite fridge also holds 4 x 1gm Fibrinogen which can be used by clinicians in emergency situations. Please inform Blood and Tissue if you are taking these for use so the Establishment can replace them.

Additionally, the Merlin Park Satellite fridge holds holds 4 x 1gm Fibrinogen which can be used by clinicians in emergency situations. Please inform Blood and Tissue if you are taking these for use so the Establishment can replace them. This satellite fridge as stated above holds 2 x O Negative Emergency units for an emergency situation but due to the distance from GUH it also contains 4 x O Positive emergency stock units which can be considered by the Clinician if they have exhausted the use of any crossmatched blood for the patient as well as the Emergency O Negative units, they cannot wait for stock delivery from GUH and are facing a critically ill patient needing blood. They then can consider these units if they are out of all other options. This is a clinical decision. If any of the emergency products are taken for use the Blood and Tissue need to be informed ASAP so they can replenish these stocks.

7.8 Delivery of Blood throughout GUH

Routine blood required for GUH is placed in the satellite blood fridges located:

GUH:	2nd floor, out-side entrance of main theatre
Gynae Theatre:	within main entrance to Obs & Gynae theatre.
MPUH:	2nd floor, Orthopaedic Block, outside theatre.

Otherwise it is taken directly from GBTE to the area where it is required. Blood Components / Products e.g. Plasma / Platelets / Albumin are taken directly to the area where they are required; do not place in a blood fridge other than the GBTE Issue Fridge. If they are not required, GBTE must be informed and they must returned to GBTE immediately.

7.9 Blood / Blood Product Prescription and Administration

All products must be prescribed on the “Blood & Blood Product Prescription & Transfusion Record” (BPTR) at clinical level.
100% traceability of all blood and blood products is required by GBTE. Bloodtrack PDAs are used to transfuse blood and platelets. The product and patient ID band are scanned on commencement as per policy CLN HVIG 08 « GUH Administration and transfusion of Red cells to an adult patient using the Manual or Electronic Method » and CLN HVIG 017 « GUH Administration and Transfusion of Platelets to Adult and Paediatric Patients using the Electronic or Manual Method » on Q-Pulse. The manual method is used for all other blood products or also used for blood and platelets if

bloodtrack is down or undergoing upgrade/unavailable. Here, following commencement of transfusion the middle (peelable) completed portion of the compatibility label is removed, placed on the BPTR. The BPTR must also contain the signatures of both administrators and the date and time. The lower portion of the compatibility label is removed and both administrators print their names and again include the date and time. This lower portion is then placed in a designated collection box in the clinical area where it is returned to the Blood Establishment for fating of the product.
A specific group of patients may require irradiated/ CMV negative blood. Guidelines for this requirement is available on Q-Pulse. See CLN HVIG 06 « GUH Request for Group and Antibody Screen, Group and Hold or Group and Crossmatch ».

When administering blood/ blood products, the checking procedure as per the relevant policies stated above, which are available on Q-Pulse must be adhered to.

7.10 Management of Transfusion Reactions

Please refer to Clinical Policy CLIN HVIG 009 "Management of Adverse Reactions, Adverse Events & Near Misses to Blood Components/Blood Products in the Clinical Setting" available on Q-Pulse. See also included Guidelines for Culturing an Implicated Blood Component where a transfusion reaction is suspected.
Also available on Q Pulse - ORG-IC-0015: Guidelines for collection of blood cultures from the patient.

7.11 Maximum Surgical Blood Ordering Schedule (M.S.B.O.S)

A Maximum Surgical Blood Order Schedule (M.S.B.O.S) is in place for GUH and should be adhered to when ordering Blood for Surgical procedures. The M.S.B.O.S is available for review as a Clinical Policy on Q-Pulse. Refer to CLN HVIG 010. Each member of staff has a professional responsibility to avoid over exposure of patients to blood/ blood products. Over ordering of blood/ blood products must be avoided and time constraints adhered to in order to prevent wastage. Blood and Blood Products are extremely costly and are frequently in short supply.

7.12 Indications for Irradiated & CMV-Negative Red Blood Cells & Platelets

Refer to policy CLN HVIG 06 'Request for Group and Antibody Screen, Group and Hold and Group and Crossmatch' on Q-Pulse.

7.13 Autologous/Allogeneic Serum Eye drops (ASE's) program

Autologous/Allogeneic Serum Eye drops (ASE's/ALSE's) are prepared using the patient's sera (autologous) which is donated by the patient as a whole blood unit or are produced from an allogeneic donor unit ordered through the Irish Blood Transfusion Service (IBTS). GBTE processes and packages the ASE for the patient. They are issued to patients as a treatment for persistent epithelial defects, Superior Limbal Keratoconjunctivitis (SLK), severe dry eye or as a support measure in ocular surface reconstruction.

7.14 Autologous Stem Cells and CAR-T service

GBTE provides an Autologous Stem Cell service to GUH and Cork University Hospital. This incorporates an autologous haematopoietic stem cell collection and transplantation service for patients with certain malignancies e.g. multiple myeloma, lymphomas etc. The stem cells once harvested are processed, cryogenically frozen and stored until required. GUH Haematologists must be contacted in advance if this service may be required.

A Car-T service is also offered by the Blood and Tissue Establishment. Contact the CAR-T co-ordinator to arrange and request this service from the Establishment.

7.15 Supply of Bone and Bone Products and Occular Tissues

GBTE is a site of human application as per the EU Tissue Directive for corneas, sclera, amnion membrane, bone, tendons, meniscus, bone chips etc. and has responsibility for other transplanted human tissue in GUH. These services are co-ordinated by the GBTE.

7.16 Blood Track

(See also noted in Section 7.9.) Blood and platelets are processed for sign out / sign into the Establishments fridges/ platelet agitators respectively via the Blood Track system. All other Blood Products are signed out manually via the Blood and Blood Products registers at the Establishment and satellite fridges. If Blood Track is non-functional all products must be manually signed out of the Blood and Blood Products registers.

7.17 Clinical Advice and Service

A Responsible Person/ Consultant Haematologist with Administrative Charge (CAR) for the Blood & Tissue Establishment is in place. This Consultant Haematologist provides an extensive advisory service and clinical advice. Examples include indications for platelet transfusion, management of massive transfusion and the appropriate use of blood products. Requests for clinical advice from other hospitals in the region are referred directly to the consultant Haematologists in GUH.
Issues relating to the Biovigilance (Haemovigilance / Tissue Vigilance) policies and protocols are referred to the Biovigilance (Haemovigilance / Tissue Vigilance) officers. Examples include sample labelling, management of reactions.

List of Consultant Haematologists in GUH	
Dr. Amjad Hayat (RP/CAR)	*Prof. Michael O'Dwyer
*Dr. Ruth Gilmore	*Dr. Janusz Krawczyk
*Dr. Margaret Murray	*Dr. Niamh Keane
*Dr. Nunez Yizel	
*Dr Teresa Biotin Lopez	*Dr Mark Gurney
*Dr Jillian Coll	*Dr Tracey Murphy
*These Consultants are available via roster held by Switch and will be available to GBTE as needed on clinical matters that arise.	

Comments or suggestions relating to the service should be addressed to the Chief Medical Scientist of the GBTE.

7.18 Turnaround Time

On receipt in GBTE specimens are date and time stamped, barcoded, initialled and logged into the LIS by the receiving scientist.
GBTE turnaround time is defined as the length of time taken from receipt of the sample in GBTE to release of the report /product in GBTE manually with report, visible on the LIS or via phone call.
Turnaround time for test requested by users will be reflected by clinical needs.
External specimens (GPs and ANC samples) are batched and analysed each day until 13:00 and in the afternoon on Friday.
External specimens received after 13:00 hours will be batched and processed on the next routine working morning with the exception of Fridays whereby all external samples will be processed on day of receipt.
If the patient has an antibody, turnaround time will depend on the serological investigations required to identify the antibody and can vary.

Test	Turnaround Time (from receipt of sample to release of product / report)
Group and Hold *	8 Hours
Group and Antibody Screen (External User)	72 Hours
Cross-Match (Urgent)* and *** and **** Cross-Match (Non-Urgent / Routine) **	50 Minutes (please always phone these) 8 Hours
Neonatal Blood Group +/- DCT***	8 Hours

*Turnaround Time provided the patient has no Antibodies.
**Turnaround Time is reflected by clinical needs and surgical date.
***Turnaround Time provided there are no blood grouping discrepancies
**** Please refer to sect. 7.6 Urgent Request Policy above also

Turnaround time applies to requests received during routine hours. Requests received out-of-hours will be authorised on the next routine working day.

Since the introduction of Termination of Pregnancy in GGUHP specimens received in GBTE (TOP associated) on female patients for group and antibody screens must now be labelled, processed, authorised and reported on the day of receipt as GP's require the written GBTE report in < 72 hours preferably within 24 hours.

7.19 CODE RED

Code Red' is the alert used in GUH to advise the Blood Transfusion laboratory of life threatening bleeds. 'Code red' indicates urgency as the blood transfusion laboratory is situated away from critical areas at the rear of the hospital.
A Code red emergency should be declared if:

- Active haemorrhage is suspected
- or/and an ongoing transfusion requirement in an adult of more than 150mls per minute
- or/and the systolic BP is < 80mmHg or/and there is a poor response to fluid resuscitation

In the event of an emergency bleed, senior clinical staff activates the alert by calling a CODE RED as per policy CLN HVIG 031 «Management of Acute Massive Haemorrhage » available on Q-Pulse. When the haemorrhage is under control clinical staff must inform the transfusion laboratory staff that the situation is now stable and stand down the code red.

8. Clinical Biochemistry Department

8.1 Department Profile

The Clinical Biochemistry Department uses biochemical knowledge and techniques to understand human health and to assist in the detection, diagnosis and treatment of disease.
The Department provides a comprehensive analytical and interpretative service including assessment of liver function, kidney function, carbohydrate and lipid metabolism, and various hormones, proteins, enzymes, therapeutic drugs, tumour-associated substances and many other chemical and biochemical compounds. Our role is to aid and advise the clinician on patient diagnosis, prognosis, exclusion of disease, to monitor patients' response to treatment, development or progression of disease and the management of chronic illness through risk stratification and the establishment of treatment/intervention targets. The Department processes about 7 million tests per year. We provide a comprehensive undergraduate and graduate teaching programme and are active in research, in developing projects and in the implementation of translational scientific research. We participate in clinical trials, case conferences, ward rounds and clinics.

The provision of a clinical biochemistry service in a prompt cost-effective, safe and user-friendly manner is dependent on highly automated analytical systems, the use of advanced analytical techniques, electronic data processing and information technology. The Department has an extensive internal quality assurance system and participates in national and international quality assessment schemes.

8.2 Clinical Advice and Service

Clinical advice and interpretation is available from the Consultant Chemical Pathologists and Principal Clinical Biochemists. Comments or suggestions relating to the service should be addressed to the Chief Medical Scientist. A clinical advisory service is available Monday to Friday 9am to 5pm by telephoning 542077.

8.3 Out of Hours Service

A detailed list of all tests available out of hours is outlined in the section "On Call (Emergency Service)". Clinical advice is available if required. Access to out of hours service for GP's is available by prior consultation with the laboratory.

8.4 Biochemistry Tests

Information on all Tests carried out in Biochemistry is to be found in the Test Directory of this manual (listed alphabetically within the Laboratory Medicine Test Directory). Stated volumes required apply to adult patients.

In the case of paediatric patients please send as much blood as possible. Where it is appropriate (i.e. patient weight >10kg) please use a 3.5mL tube, otherwise standard paediatric bottles may be used.

Where small sample volumes are submitted, list the tests requested in order of priority as the volume of serum/plasma obtained will dictate how many can be performed.

In the event of a specimen being unsuitable for processing or where there is an analytical failure, the clinician will be informed by phone or in writing.

Test Profiles

The test profiles defined in the following table are available to requesting doctors. Please use the profile names given below as these are the only profiles defined and recognised by the Clinical Biochemistry department. Non-specific and vague statements such as "biochemistry screen" or "bioprofile" should not be used. Terms such as cardiac enzymes, SMAC, SMA12, SMA, hormone profile, tumour marker etc. are vague, undefined and unfocused and should not be used when requesting tests. "Toxicology screen" is not sufficiently specific and should not be requested. Instead, urine drugs of abuse screening or testing for a specific drug / metal being queried, may be more appropriate.

Profile Name	Assays included in profile
GP (GP profile) Requested by GPs only	Sodium, chloride, urea, creatinine, calcium, albumin, total protein, total bilirubin, alkaline phosphatase, alanine transferase (gamma GT if ALP elevated) Potassium analysed only if specifically requested and sample received in the lab within 3hrs of venesection or sample received centrifuged
If Specimen aged	Sodium, chloride, urea, creatinine, calcium, albumin, total protein, alkaline phosphatase, alanine transferase, (gamma GT if ALP elevated)
HP (Hospital profile) Requested by hospital clinicians only	Sodium, potassium, chloride, urea, creatinine, calcium, albumin, inorganic phosphate, total protein, total bilirubin, alkaline phosphatase, alanine transferase, gamma GT.
If Specimen aged	Sodium, chloride, urea, creatinine, calcium, albumin, total protein, alkaline phosphatase, alanine transferase, gamma GT
Renal Profile – hospital requests only	Sodium, potassium, chloride, urea, creatinine
If Specimen aged	Sodium, chloride, urea, creatinine
LFT (Liver profile)	Total protein, albumin, total bilirubin, alkaline phosphatase, alanine transferase, gamma GT
If Specimen aged	Total protein, albumin, alkaline phosphatase, alanine transferase, gamma GT
Lipid Screen (LIP)	Cholesterol, HDL, triglycerides, calculated LDL, CHOL/HDL Ratio
Iron Studies (Iron)	Iron, Transferrin, calculated TIBC, transferrin Saturation
Thyroid Function Tests (TFT)	Free T4, TSH

Summary of Request Forms and Blood Specimen including Volume Requirements

A single request form may be utilised for General Biochemistry, Glucose and HbA1c requesting, ensuring the appropriate number of specimens are provided. Specialist tests performed in-house and special assays referred to external laboratories require individual request forms and separate specimens. Once collected, submit the entire specimen to the laboratory with the appropriate request form.

ADULT PATIENTS	
General Biochemistry tests including renal, liver and thyroid function, uric acid, HCG, tumour markers, digoxin, magnesium, lipids, iron studies, osmolality, lithium, alcohol, salicylate, paracetamol, amylase, bicarbonate, therapeutic drug monitoring and fertility	One plain serum gel tube (must be filled) Type: Greiner Vacuette ® Serum Gel Tube Colour Code: Gold
Specialist tests performed in-house	Please refer to the specific requirements for individual tests in the alphabetical listing in the Test Menu
Glucose	One fluoride oxalate tube Type: Greiner Vacuette Tube Colour: Grey
HbA1c	One EDTA tube Type: Greiner Vacuette Tube Colour: Lavender
Special assays referred to external laboratories	Please refer to the specific requirements for individual tests in the alphabetical listing in the Test Menu

PAEDIATRIC PATIENTS	
General Biochemistry Tests	Greiner Vacuette ® 3.5mL where appropriate, (weight >10kg) otherwise Sarstedt Brown capped 1.1mL Z-Gel tube
Plasma Glucose	One fluoride oxalate tube Greiner Vacuette ® Colour: Grey where appropriate otherwise Sarstedt Microvette ® 300 Fluoride Heparin tube
HbA1c	Greiner Vacuette ® EDTA tube where appropriate otherwise Sarstedt Microvette ® 300 EDTA tube

Requesting doctors are advised to liaise with the laboratory in advance of specimen collection when difficulties in obtaining blood specimens are expected. In these situations, tests requested should be ranked in order of priority.

8.5 Reference Intervals

To aid in the interpretation of clinical biochemistry reports, age and sex specific reference intervals are provided for most laboratory results. The reference intervals reported are based on population studies of non-pregnant individuals whose gender identity is the same as their sex assigned at birth. The clinical biochemistry service do not record a patient's pregnancy status and only record a patient's sex as that specified on the request form. Therefore clinicians need to be aware that the reported reference intervals may not always be appropriate in pregnant or transgender patients. If on the request form it states that the patient is transitioning from male to female or female to male, unless specifically indicated by the requestor, the sex at birth is entered as the patients' sex. If required, additional advice on reference intervals for pregnant or transgender patients can be provided.

8.6 Turnaround Time Targets

Turnaround time (TAT) is defined as the time from receipt of specimen in the biochemistry laboratory until the result is reported in the LIS. TAT is adversely affected when there are excessive demands for urgent assays. We will endeavour to meet the following turnaround times for routine assays. Please see the alphabetised test list for target turnaround times for more specialised assays.

Category	Target turnaround time
Urgent requests	2 hours
Priority requests	3 hours
Routine requests	4 working days

8.7 GP Specimens

Ideally, samples for analysis should arrive as soon as possible or at least within 4 hours of collection. If a longer delay is expected then blood specimens should be centrifuged prior to submission.
GP samples arriving before 19:45 will be centrifuged on the day of receipt. Specimens due to be delivered after 20:00 should be centrifuged at the point of collection as such work may not be centrifuged until the following routine working day with the result that the specimens will be aged and unsuitable for analysis for potassium, inorganic phosphate, AST and some other parameters.

Un-centrifuged specimens greater than two days post phlebotomy are not accepted for analysis.

Centrifuged specimens greater than seven days post phlebotomy are not accepted for analysis.

Subject to the volume of work received and the available staff resources samples will be processed as soon as possible following receipt. The target turnaround time for routine GP requests is 4 working days.

8.8 Add on Test Requesting

Clinical Biochemistry specimens are stored in a fridge for up to 7 days or space permitting. Subject to individual analyte stability, further tests on a specimen that is already in the laboratory can be requested by submitting an additional request form. The form should be completed as usual, with the addition of the specimen number and the additional tests required. This number can be found by checking the laboratory enquiry screen or the paper report. GP's should fax in the request forms or provide to courier service on the next available courier run. Phone requests for add-on tests are only accepted from the Resus Unit in the ED, and remote hospital locations.

8.9 Referred Specimens

Tests not done on-site are recorded, pre-processed to ensure stability and referred to outside laboratories for analysis. Information on these tests is included in the test directory.

8.10 Clinical Details

The inclusion of brief clinical details including relevant medication assists the Clinical Biochemistry Laboratory in providing the most appropriate service for requesting doctors.

8.11 Critical Results

Results falling outside defined critical limits will be telephoned to the requesting source.

8.12 Therapeutic Drug Monitoring

See the Test Directory for details of individual drug assay requirements. The time since last dose should be given on the request form.

8.13 Fluid Analysis

We provide analysis of various fluids including pleural effusions, acetic fluids and peritoneal dialysis fluid. Appropriate general biochemical assays are provided including pH, protein, glucose, LDH, amylase, creatinine, triglyceride, and cholesterol. The various requirements for these fluid assays are not listed in the Test Menu section of this book. Therefore you should contact the laboratory if you have any queries and staff can reference the appropriate standard operating procedures to provide the information required.

8.14 Near Patient Testing (NPT)

We provide an integrated NPT service for glucose monitoring, ketone monitoring, critical care blood gas analysers, HbA1c testing and Hypoglycaemic metabolic screening packs. In order to achieve high quality results it is essential that all users adhere to NPT policy and guidelines.

Use of analysers is only permitted following training which is organized by the Clinical Biochemistry laboratory. If training in the use of any of the NPT analysers is required contact the Senior Medical Scientist with responsibility for NPT at ext. 2725 or email npt@hse.ie.

Follow the instructions for the disposal of waste in order to minimize health, safety and infection risks.
Critical Care analysers are located in ICU, HDU, AMAU, Theatre, CTICU, ED, NICU, Labour Ward, ESU, Shannon, Clinical Biochemistry and SCU MPUH.
Blood glucose meters are located throughout GUH and MPUH. There are over 120 glucometers in use.
Ketone meters are available in critical care and diabetic outpatient services.
Hypoglycaemic metabolic screening packs are located in paediatric areas: Paediatric ED, Red Resus, NICU, Bernadette's, PDU and Paediatric OPD.
HbA1c analysers are located in Paediatric OPD and DDC.

The development of an integrated laboratory-connected and managed NPT service for critical care analysers, glucose meters, ketone meters and intra-operative PTH is complete throughout the Galway University Hospitals. The NPT service is under the governance of the multidisciplinary Laboratory Medicine Directorate with a NPT Steering Committee available in the Hospital. Training and education and support programmes developed and implemented by scientists from the Clinical Biochemistry Department are the cornerstone of the evolving accreditable NPT service where staff are

accountable, risk is minimised and the quality of results are on a par with conventional laboratory analysers. Results of NPT analysers form part of the electronic patient record through connectivity of all major NPT devices with iLab.

Feedback

The clinical biochemistry department welcomes feedback from clinical users and patients, both positive and negative. All feedback is communicated to management and staff to allow us to shape our processes. Complaints are recorded in our quality management system and fully investigated, with feedback on root cause and actions required, where relevant, to the complainant.

Patient Consent

For most routine laboratory procedures, consent can be inferred when the patient willingly submits to the sample collecting procedure, for example, venepuncture. Any further patient consent requirements are outlined in the alphabetical test directory contained in section 16 of this document. Patient consent remains the responsibility of the requesting clinician and the laboratory cannot accept responsibility for referral laboratory rejection of requests due to patient consent being unavailable.

9. Division of Anatomic Pathology

The Division of Anatomic Pathology provides a wide range of diagnostic and consultative services to clinicians and other service users. Specimens are routinely received through the acute hospital setting, as well as from GP's and regional hospitals.
The division acts as a tertiary referral centre for hospitals and clinicians both regionally and supra-regionally. Advisory services are provided through numerous multi-disciplinary team meetings as well as by direct referral. The Division of Anatomic Pathology comprises Histopathology, Cytopathology, Molecular Pathology and Autopsy Departments.

9.1 Division Profile

The aim of the Division of Anatomic Pathology (DAP) as a Regional, Supra-Regional and Tertiary service is to provide a high quality diagnostic service to meet National and EU objectives of reducing the incidence of cancer through early detection and appropriate service delivery, and also to provide a high quality non-cancer related diagnostic service. The Division is committed to providing a timely and efficient service to patients, Clinicians, General Practitioners and all users of the service. University Hospital Galway has been designated a supra- regional status for the delivery of cancer services and the laboratories provide a central role in the delivery of that function.
The Division of Anatomic Pathology provides a diagnostic and consultative service to clinicians and indirectly to their patients. The Division receives, processes, and reports on tissue and cytological specimens that result from Medical, Surgical, Paediatric, Obstetrics and Gynaecology, and General Practice. This list is not complete. The service works closely with clinical, radiological and screening services to provide best practice patient care for diagnosis of disease and patient management.

Histopathology provides Routine Histology and Advanced Diagnostic services. Specialised histopathology services are provided for breast, colorectal, gynaecological, lung, liver, prostatic cancer, urology, renal, endocrine, head and neck, cardiothoracic, perinatal and skin disease. Advanced Diagnostics include an extensive immunohistochemistry, in situ-hybridization (ISH) and direct Immunofluorescence service, in addition to the special stains, electron microscopy report interpretation and frozen section service provided.

Cytopathology services include: Diagnostic cytology; on site pathologist assisted fine needle aspiration (FNA) service & evaluation of joint fluids for crystals.
Molecular Pathology services are provided on both histological and cytological material. This includes on site evaluation of HER 2 status by DDISH for cancer patients, as well as mutation analysis.
This service is provided by Consultant Pathologists, Non-Consultant Hospital Doctors, Medical Scientists, Laboratory Aides and Clerical personnel.

The Division aims to provide a comprehensive, effective and high quality service and to support the ongoing education and training of Medical and Scientific staff. The Division is accredited by the Royal College of Pathologists for specialist training in Histopathology and is also accredited by the Academy of Medical Laboratory Science for the training of Medical Scientists.

The Division of Anatomic Pathology (DAP), University Hospital Galway's quality management system has been designed to meet the requirements of ISO15189 2022: Medical laboratories- requirements for quality and competence. Refer to www.inab.ie to check the current status of accreditation. The DAP is a participant in the National Histopathology Quality Improvement Programme, and is active in EQA, and IQC. The Division regularly participates in case conferences and multidisciplinary meetings.

The Division of Anatomic Pathology ensure that patients well-being, safety, and rights primary considerations. The laboratory conforms to the HSE Code of Conduct and Behaviour in the provision of its service, including the rights of patients to care that is free from discrimination.

9.2 General Information

The information given in the Division of Anatomic Pathology section of the User Guide is supported by the details available in the first section of the User Guide. The details given in this first section include:
General information in relation to location, postal address, general enquiries, contact information, population served, and the laboratory opening hours.

Guidelines for the general use of the laboratory including: register of users, requests to the laboratory, request form and sample acceptance criteria, specimen request form, specimen container, supplies of request forms and specimen containers, collection of specimens, and general guidelines details are provided in the first section of the user guide.
The DAP require that samples received into this lab be on the appropriate Divisional request forms and contain the information on the request form and container as outlined in the General Information section of this guide. The patient should be appropriately prepared for the procedure and the sample being taken. When laboratory staff are in attendance, as may be the case in fine needle aspiration procedures, the patient should be informed.

Special counselling may be needed for examination results with serious implications for the patient at the discretion of the clinical team.

The DAP provides opportunities for patients and laboratory users to provide helpful information to aid the laboratory in the selection of the examination methods, and the interpretation of the examination results. Contact may be made directly with the Chief Medical Scientist (CMS), the Head of Department (HoD), and members of the Consultant staff. DAP staff Email and telephone contact information is given in section 2.3 of this document. Feedback may also be given via the "Your Service Your Say" mechanism accessible on the HSE website.

In relation to specimens submitted to the Division of Anatomic Pathology, the type of primary sample and the anatomic site of origin, where appropriate (e.g. BAL left lobe, Right breast biopsy) must be stated. Relevant clinical information should be provided.

Dispose of all clinical waste in accordance with national guidelines.

The DAP uses referral services for some of its tests. Where a referral service is used it is referenced in the test report.

9.3 Specimen Acceptance

Note: Non adherence to the requirements for the specimen and the test request poses risks to the quality of the service the DAP is able to provide for the case concerned and for the patient. These risks include: rejection of the specimen, compromise to the specimen prior to receipt by the lab, compromise to the report, compromise to patient management, and or patient impact.

The information necessary for the acceptance of a specimen is defined for the request form and the specimen container. The information supplied must be sufficient to match the form and the sample and sufficient to make the primary sample traceable to an identified individual. Multiple samples on one form are acceptable and should be labelled A, B, C etc. where possible. **The specimen site must be specified on the pot and the form.**

Form information acceptance criteria:

- Patient's first name and surname
- Patient's address
- Patient's date of birth (DOB)
- Patient's Board number/ Hospital number, where applicable
- Name of Clinician or GP
- Location of patient e.g. ward, where applicable
- Type of primary sample and anatomic site
- Examination requested

For Colorectal Programme Forms the NCSS COR Number is Mandatory.

Container information acceptance criteria:

- Patient's first name and surname and

A minimum of two of the following identifiers must be present:

- Patient's address/ DOB/ Board or Hospital number
- Type of primary sample and anatomic site

Note: it is not possible or safe at the moment of receipt of the specimen(s) in the Division of Anatomic Pathology to check each pot for the presence of a specimen. Therefore acceptance of a specimen test request by the DAP staff is not confirmation that the described specimen is present in the container, but rather that the form details and the container details, and where applicable the sign off book details, match and contain the information required. The absence of a described specimen may not be noted until the specimen container is opened in the sampling area of the lab. The absence of a described specimen is recorded as a non-conformance. The sender is informed of the issue as soon as possible by the DAP staff.

Information on all tests carried out in Histology, Cytology, and Molecular Pathology is included in the Test Directory of this User Guide (listed alphabetically).

9.4 Histopathology

Specimens

Specimens should be submitted intact and should not be dissected in the theatre as this may prevent proper gross examination in the laboratory and may interfere with the selection of appropriate tissue sections for microscopy.

Containers: Histopathology request forms and prefilled specimen containers are issued from Laboratory Stores (ext. 4377). Larger specimen containers and buffered formalin for use in the theatres and wards are available from the Histopathology Laboratory ext. 4589.
Ensure that the container selected is large enough to allow the specimen to be immersed in at least twice its own volume of buffered formalin. The container (not the lid) must be clearly labelled with the patient's full name, date of birth, and specimen type and anatomical site. This is particularly important in Histology where specimens may be multipart or left or right etc. SHARPs containers are **not** suitable to use for Histology specimens. **Ensure that the lid is securely closed on the container.**
All specimens must be received with an accompanying legible request form containing required information.
Failure to submit essential information will result in the non-acceptance of the specimen and will cause unnecessary delays in issuing reports.

Urgent Specimens
Urgent formalin fixed specimens should be accompanied by the request form which clearly states URGENT.

Urgent unfixed specimens e.g. frozen section must be pre-booked with the Consultant Pathologist (ext. 4589) 24 hours in advance. (See below for detail re: Frozen section, skin or renal tissue for Immunofluorescence studies, fresh lymph nodes query lymphoma, muscle biopsies, sural nerve biopsies).

Out of hours service requests must be arranged directly with the Consultant Pathologist through the Hospital switchboard.

Frozen Sections
Avoid if there is a danger of infection e.g. if tuberculosis is strongly suspected, frozen sections will not be done if there is a danger of infection. Alternative approaches to rapid diagnosis can be discussed with the Consultant rostered on 'Frozens'.

Prior Arrangement
Please book frozen section 24 hours in advance with the Consultant Histopathologist rostered for 'Frozens' (ext. 4589). If possible put the operation at the beginning of the operation list.

If the operation is delayed or if it is subsequently found that the frozen section is not required, please notify the Histopathology staff without delay at ext.: 4589.
The unfixed tissue sample is transported directly to the laboratory by portering staff in a fully labelled dry container accompanied by a fully completed request form. Include the contact details for immediate call back of frozen section result.

If the Frozen Section is cancelled or delayed please notify the Histopathology staff as soon as possible. Tissue for frozen section must be handed directly to a Medical Scientist, NCHD or Consultant Histopathologist.

Unbooked Frozen Sections: Frozen sections that are required but not booked during the 'normal working hours' (09:00 -17:00 h) must be discussed with the Consultant Histopathologist rostered for 'frozens' before any samples are taken. Contact switch for consultant on call.

Immunofluorescence on Skin Biopsies
Please notify the Histopathology staff (ext. 4589) at least 24 hours in advance.
Place the biopsy in a fully labelled suitable sized container without any preservative and deliver to the laboratory immediately, with its completed request form. Include contact details.

The sample may also be sent in a suitable transport medium (e.g. Michel's or Zeuss medium).
If sending by post, ensure the package is addressed to the Histology **Lab**, rather than the department. The specimen must be delivered directly to the Histology lab without delay.

Renal Biopsies for Immunofluorescence and Electron microscopy
Please notify the Histopathology staff (ext. 4589) at least 24 hours in advance.
Place the biopsy in normal saline to maintain hydration and deliver to the laboratory immediately, with completed request form. Include contact details.
EM is not performed in GUH histology, referred out and EM reports interpreted on site in context of clinical information.

Fresh Lymph Nodes query Lymphoma
These should be booked with the Consultant Histopathologist. Please notify the department (ext. 4589) at least 24 hours in advance.
Place the biopsy in a fully labelled, suitable sized container without any preservative and deliver to the laboratory immediately, with completed request form. Include contact details.
Core biopsy of lymph nodes are not advised for Flow as sample adequacy cannot be guaranteed.

Muscle Biopsies
These should be booked with the Consultant Histopathologist. Please notify the department (ext. 4589) at least 24 hours in advance.
Place the biopsy in a fully labelled, suitable sized container, in saline moistened gauze (not drenched), and deliver to the laboratory immediately, with completed request form.

Sural Nerve Biopsies
These should be booked with the Consultant Histopathologist. Please notify the department (ext. 4589) at least 24 hours in advance.
Place the biopsy in a fully labelled, suitable sized container in saline moistened gauze (not drenched), and deliver to the laboratory immediately with completed request form.

Radiation Specimen
Ensure that the container selected is large enough to allow the specimen to be immersed in at least twice its own volume of buffered formalin. The request form and specimen containers must each be labelled with a radiation label. The radiation dose information must be given.

Deliver to the designated radiation area in the cutup room immediately with completed request form. Leave specimen containers behind lead shield. Then notify Histology Medical Scientific Staff for specimen reception.

Outside normal working hours

Please notify the Histopathology Department (ext. 4589) in advance of 16:00 h.

Samples which may be delayed in transit to the laboratory should be placed in fixative solution (eg. Formalin) or refrigerated to prevent deterioration of the specimen. **Clinicians must ensure that unfixed specimens such as CSF are not submitted outside of normal working hours.**

Post Vasectomy Analysis

Sample should be collected after a minimum of 48 hours and not longer than 7 days of sexual abstinence.

The specimen should be obtained by masturbation and ejaculated into a clean wide-necked container (provided by the laboratory or GP). The container should be body warmed to minimise the risk of cold-shock. Condoms should not be used in the collection as these contain spermicide, which swiftly obliterates sperm motility.

Coitus interruptus is not acceptable as a means of specimen collection as it is possible that the first portion of the ejaculate, which usually contains the highest concentration of spermatozoa, will be lost.

Excessive heat or excessive cold could easily damage sperm. The semen specimen therefore should be brought to the laboratory at close to body temperature.

The specimen bottle must be labelled with the Patient's name, date of birth and date and time of collection. It must arrive with a fully completed request form. It is best that the semen sample is delivered within 1 hour of production to the laboratory, Monday to Friday 09:00 to 11.30 and 14.00 to15.00 h. **Note: This analysis is a screening service which does not include a formal quantification of spermatozoa per British Andrology Society guidelines and is not an accredited test. Clinical judgement is required in the interpretation of the results.**

Placentas

Placentas from labour ward should be placed in adequate formalin fixative and placed in the large size container. Ensure that the placenta requisition form is used and clinical details are filled in. Ensure that the placenta requisition form, the container and container lid are labelled with specimen type -Placenta and with patient demographics. Clinical details should always include gestational age at time of delivery, in addition to other relevant clinical information as specified on the placenta requisition form. Monochorionic Twin placentas are recommended to be sent in fresh without formalin for injection studies. Notify Perinatal Pathologist on call if a specimen requiring injection studies is sent over fresh. For products of conception where there is a suspicion of the presence of a fetus, it is recommended to send fresh, only during the operational hours of the laboratory, as to not compromise the villous morphology for molar pregnancy assessment.

9.5 Cytopathology

Samples resulting from direct shedding of cells or exfoliative cytology specimens such as voided urines and sputum are easily collected. However, Cystoscopy, Endoscopic brushings, lavages, washings, Fine Needle Aspirates (FNA), CT and ultrasound guided techniques, magnetic resonance and tomography can provide sophisticated methods to obtain optimal samples for cytological evaluation, bringing the practice of clinical cytology to the forefront of preventive and diagnostic medicine.

The department provides: a diagnostic cytology service, an on-site Pathologist Assisted FNA service and the evaluation of joint fluids for crystals.

Cytopathology can process fluids from any body cavity, lump or swelling, including the following:

Abdominal fluid	C.S.F	Pleural fluid
Ascitic fluid	Cyst fluid	Pericardial fluids
Breast aspiration	Effusions	Sputum
Breast cystic lesion	FNA/FNAC – breast, parathyroid, thyroid lumps	Urine

Bronchial washings, lavages (LLL, RML,RLL,BAL,)	Ovarian cyst fluid	Joint fluids for uric acid crystals
Crystals in body fluids / joint fluids/	Peritoneal fluid	

Note: Cytology will not be performed on a? CJD or a CJD sample

Note: Drainage bags or needles must not be submitted to the laboratory.

Note: Where slides are being submitted for DAP analysis- the number of slides being submitted should be recorded on the request form.

Test volumes, Fixation & Storage
Tests may be submitted in 30ml universal containers, containing Shandon fixative fluid supplied by the laboratory.

Drainage bags or needles are not acceptable.

Bronchoscopy specimens may be submitted in 20-50 ml containers containing saline solution.

CSF's which need to be split for microbiological assessment must be sent unfixed for microbiological assessment and subsequently forwarded for cytological assessment.

Specimens for cytological assessment may be refrigerated overnight if a delay in delivery is anticipated.

Pathologist assistance at FNA is available in GUH. To check availability of pathologist, ring 4883, or alternatively, the Pathologist rostered may be contacted via hospital switchboard.

Please refer to the Test Directory for further information on submission requirements. Fixative is available from the laboratory to registered service users, by telephoning or faxing requisitions for supplies.

Joint Crystals
Samples should be submitted unfixed and refrigerated if immediate transportation to the laboratory is not possible.

Fine needle aspiration service
A Pathologist assisted Fine Needle Aspirate service is available and must be booked in advance by telephone extension (54) 4883.

EBUS (Ultra sound guided Endobronchial Specimens)
EBUS specimens are submitted to the laboratory in universal containers to which formalin has already been added (available from Cytology Laboratory). Smears prepared at EBUS for Cytological evaluation should be labelled with patient name, date of birth or Board No., specimen site (e.g. LN 4R) and also clearly indicate whether slide has been air dried (for diff quik staining) or alcohol fixed (for Pap or H&E staining). The number of slides being submitted should be recorded on the request form. Please note there is no out of hours or weekend Diagnostic Cytology service.

9.6 Molecular Pathology

The molecular laboratory provides in situ hybridisation service for confirmation of Breast and Gastric HER-2 status, and a mutation service for Non-Small Cell Lung Cancer adenocarcinoma (NSCLC), Colorectal Cancer (CRC) and Malignant Melanoma. The mutation statuses of predictive and prognostic markers are reported in a panel format. The NSCLC panel reports the EGFR/ALK/ROS-1/KRAS and BRAF status, CRC panel reports the KRAS/NRAS and BRAF status and the MM panel reports the BRAF and NRAS status. External Quality Assurance is maintained through participation in UK NEQAS (National External Quality Assurance Scheme) and GENQA (Genomics Quality Assurance). Request forms for molecular assays are available from the Department of Histopathology, Cytopathology and Molecular Pathology, Ext 4078. NSCLC adenocarcinoma with no mutations detected by the in-house panel will be referred to Cancer Molecular Diagnostics in St James Hospital for NGS analysis with the Lung Adenocarcinoma Focus assay. Melanoma panels with no mutations detected by the in house panel will be sent to St James Hospital for NGS analysis with the Melanoma Focus assay.

EGFR

Non-Small Cell Lung Cancer samples are tested using the cobas® EGFR Mutation V2 Test which is CE-IVD marked. This assay can detect mutations in EGFR exons 18, 19, 20 and 21 with at least 5% mutation level using the standard input of 50 ng per reaction well. Sensitising mutations detected are: Exon 19 p.Gly719X (3 possible), Exon 19 Deletions (29 possible), Exon 21 Leu858Arg (n.2573 T>G, 2573_2574TG>GT). Resistance mutations detected are: Exon 20 insertions (5 possible), Exon 20 p.Thr790Met (n. 2369 C>T), Exon 20 Ser768Ile. This sensitivity was replicated "in-house" using blends of mutation and wild type DNA. This assay covers 85% of known EGFR mutations. EGFR reference sequence LRG_304tl.

ALK
Non-Small Cell Lung Cancer samples are tested using the Ventana anti-ALK (D5F3) antibody, positive cases are confirmed using the Agilent IQ ALK FISH Breakapart Probe Kit and interpreted according to the Vysis ALK Breakapart probe package insert. Reference Sequence LRG_310tl.

ROS-1
Non-Small Cell Lung Cancer samples are tested using ROS-1 assay was carried out using the Agilent IQ ROS-1 FISH Breakapart Probe kit and interpreted according to "Testing for ROS-1 in non-small cell lung cancer: a review with recommendations. Bubendorf *et al.* Virchows Arch (2016) 469:489-503

KRAS
Samples were tested using Roche KRAS V2 LSR for detection of mutations in codons 12/13, 59/61, 117 and 146 of the KRAS gene in DNA derived from formalin-fixed paraffin-embedded human colorectal cancer (CRC) tissue. KRAS mutation coverage 99.1%. The Roche KRAS V2 LSR can detect KRAS mutations at ≥5% mutation level using the standard input of 50 ng per reaction well, this sensitivity was replicated with "in house" sensitivity studies. Reference sequence accession number NM_004985.4.

NRAS
Samples were tested using Roche BRAF/NRAS LSR for the identification of mutations in codons 12/13, 59-61, 117, 146 of the NRAS gene. The assay covers 96.3% of NRAS mutations in malignant melanomas/colorectal cancers. The Roche BRAF/NRAS LS can detect NRAS and BRAF mutations at ≥5% mutation level using the standard input of 50 ng per reaction well; this sensitivity was replicated with "in-house" sensitivity studies. HGVS nomenclature according to Genbanks sequences: LRG_92tl.

BRAF
The Roche BRAF/NRAS LSR assay was used for the identification of BRAF mutations in codons G466, G469, V600X and K601 mutations. The assay covers 96.5% of NRAS and BRAF mutations in malignant melanomas. The Roche BRAF/NRAS LS can detect BRAF mutations at ≥5% mutation level using the standard input of 50 ng per reaction well; this sensitivity was replicated with "in-house" sensitivity studies. HGVS nomenclature according to Genbank sequence: LRG_299tl.

HER-2 DDISH service
The Ventana DDISH Assay is designed to quantitatively detect amplification by light microscope of the HER2 gene via two colour chromogenic in situ hybridization (ISH) in formalin-fixed, paraffin-embedded tissue specimens of human breast cancer and gastric cancer. Results are reported according to; Human Epidermal Growth Factor Receptor 2 testing in Breast Cancer. American Society of Clinical Oncology/ College of American Pathologists Clinical practice Guideline Focused Update. DOI: 10.5858/arpa.2018-0902-SA.

9.7 Clinical Advice

Clinical advice and service is available from the Consultant Pathologists. Pathologists regularly participate at Multi-disciplinary meetings in the hospital. Once a case is considered to require "critical value reporting" the pathologist will contact the clinician directly responsible for the patient's care to inform them of significant and/or unexpected surgical pathology findings. Generally the concerns will be communicated using the telephone.

The pathologist will incorporate details of to whom the critical value report was communicated and the time and date of the communication in the final hard copy report. Details of this communication are recorded in the body of the report. All such telephoned reports will be followed up with the Standard Hard Copy report..

Comments relating to the service should be addressed to the Chief Medical Scientist.

9.8 Turnaround Times

P code	Current DAP Target TAT GUH
P01 All	3-11
P02 All GI	3-11
P03 Cancer resection cases	7-11
P04 Non cancer resection cases	7-14
P05 Non Gynaecological Cytology-CSF	5
P06 Non Gynaecological Cytology-FNA	5
P07 Non Gynaecological Cytology- Exfoliative	5

10. Mortuary services-Autopsy/Post Mortem (PM)

The Autopsy/PM Service involves the examination of the body after death primarily to establish the cause of death (a Coroner's requested PM). It may be used in rare cases to examine the extent of disease, disease progression or the response to treatment (a Hospital/Consented PM).

All bodies of deceased persons who died in Galway University Hospitals, are initially transferred to the hospital mortuary, even if no Autopsy/PM is indicated. Funeral arrangements cannot be finalised and bodies cannot be released from the hospital mortuary until the mortuary staff establish whether an Autopsy/PM is requested or not, by the Coroner, (as all deaths are currently notifiable to the Coroner) and need his permission to be released, from the hospital mortuary.

On every ward and clinical area there is a new updated Algorithm, August 2022, clearly explaining the pathway and process for this initial Coroner contact details and times and the email of document R688_ Rev 3, to him, step by step.

Coroner's Autopsies/PM's (ALL Deaths are currently Reportable to the Coroner)

When a patient dies, or is brought in dead (BID) from the community, the Coroner must be contacted.
In addition to contacting the Coroner, the Consultant Pathologist must be notified by the Registrar/Consultant and provided with any available details on the case and the case scheduled for the PM.

Official identification of the deceased is completed by the next of kin to a member of the Gardaí. If the family are not in a position to complete the identification it can be done by a member of the Medical/Nursing staff whom the deceased is known, both when living and deceased.

Ref: Q-Pulse IM-MR-025 updated July 2022.

Inpatient Post Mortem Checklist

(Coroner's case)
The Consultant or Registrar speaks to the relatives of the deceased and informs them about the necessity for a post-mortem examination and why the Coroner needs to be involved.

The Consultant or Registrar discusses the Autopsy/PM with the Next of Kin, explaining in detail what the examination entails.
A copy of the information booklet re: post mortem examination and the hospital Bereavement booklet are given to the family (both booklets updated July 2022).
Coroners Post Mortem form completed with the next of kin (R842)
Details of death form, R770 Rev 1, is then also completed by the Registrar/Consultant for the Consultant Pathologist/Mortuary Staff information.
These original forms are filed in the HCR.

The case notes together with a clinical summary of the case is sent to the Pathologist prior to the post-mortem examination.

The Garda are contacted and asked to come to the Ward/Department to facilitate with the formal identification with the next of kin/or staff member to whom the deceased was known to when living and deceased.

If during working hours, 9.30am-5pm, Monday-Friday, the family are informed of the availability of the Bereavement Officer, should they like her presence at this time. If out of hours, then the business card of the Bereavement officer should be offered/given to the grieving family for them to make contact in their own time.
Contact phone: Ext 4823. Mobile: 087 9684 271. Bleep 615.

The deceased is prepared in accordance with the hospital policy for transfer to the mortuary.

The family/next of kin can contact the mortuary dept. directly 091 544412 to find out the expected time of release of the body, so that they can make necessary funeral arrangements.

Perinatal cases for Coroners post mortem should use Perinatal Post mortem documentation packs for Coroners post mortems, available on the appropriate wards. The perinatal post mortem information booklet should also be provided to parent and the perinatal post mortem.

Perinatal pathologist to be contacted with information regarding the case.
Cytogenetic testing on skin biopsy and skeletal survey is to be arranged by clinical team prior to post mortem examination.

Coroner's Post-Mortems brought in from the Community (BID).

The Garda to inform the Mortuary Department prior to bringing in bodies for a Coroner's post-mortem. If after working hours (5pm-9am), Mortuary Staff on-call can be contacted through the switchboard (30 minutes prior to arrival), to enable Mortuary staff to be at the mortuary when the deceased arrives.
The Pathologist/mortuary staff is contacted for formal identification with the Garda (if late at night the Garda is requested to attend the mortuary the following morning at 9.30 am for the identification).

The Garda to accompany the body to the mortuary. Details to be filled into the mortuary register, post-mortem register and temporarily retained organ retention register.

The Garda to email completed C71 with details of deceased and circumstances of death to relevant Coroner and the hospital mortuary.

The deceased is prepared in accordance with hospital policy for the post-mortem examination.
The post mortem protocol to be filled out.
I.D. bands to be put on to deceased wrist and leg.
The weight and height are recorded.
The deceased clothing, jewellery or valuables are recorded in the patient's property book in the presence of the Garda.
If organs need to be temporarily retained for further examination the Coroner is informed along with the Bereavement Liaison Officer, who discusses/ informs this need to the next of kin.

Hospital Autopsy/Post Mortem/Non-Coroners PM

As ALL death are notifiable to the Coroner, the previous steps, as per the Algorithm are followed, re contacting the Coroner and emailing him the form R688_Rev 3 for his awareness and consideration.
Once it is known that the Coroner is NOT requesting a PM, but that the Consultant/family are, then proceed with this below process.
The Consultant or Registrar discusses the Autopsy/PM need with the Next of Kin, explaining in detail what the examination entails.
A copy of the information booklet re: post mortem examination and the hospital bereavement booklet are given to the family (updated July 2022).

The Autopsy/PM request and consent form should be completed, after consent to a post-mortem examination has been received from the next of kin (Form R678 c2 Rev 4). A brief clinical history with a clinical diagnosis and a list of questions to be answered should be included.

Post Mortem Consultation Form Completed (R770 Rev 1). These deaths should always be discussed with a Consultant Pathologist ahead of time. The patient's chart must accompany the body to the Mortuary. All IV lines and E.T tubes should be left in situ in order that the Pathologist can document same, prior to the post mortem examination.

Perinatal cases for Hospital post mortem should use perinatal post mortem consent packs for Hospital consented post mortems, available on the appropriate wards. The perinatal post mortem information booklet should also be provided to parent and the perinatal post mortem.

Perinatal pathologist to be contacted with information regarding the case.
Cytogenetic testing on skin biopsy and skeletal survey is to be arranged by clinical team prior to post mortem examination.

Foetus
Post-12 week Foetus
The protocol is as for a mature baby i.e. fully informed written consent of the parent for post-mortem examination is required.

Pre-12 week Foetus
Where pre viable foetal remains are identified they are buried or cremated in accordance with Parental preference. These arrangements can be discussed with Parents by Medical or Midwifery staff. Bereavement Support Midwife/BSM will liaise with the Parents to finalise the arrangements. Ext 3614, Bleep 015 or Mobile: 087 7712329.

Cremation
When cremation is the families' choice, arrangements must be made by them through the Funeral Director.
The Funeral Director will deliver the Medical Certificate form (Form C) to the ward to be completed by a Doctor.
If the family state this at the time of death or before death, the cremation form can be downloaded from the Crematorium website for completion.
If the decision is made after the family have returned home, the Mortuary Staff will assist the Funeral Directors with the collection of forms where the Funeral Director is not local.
The doctor completing the form must be fully registered (post intern) on the Medical Register of Ireland and must have seen the person alive before death and viewed the deceased remains after death.
When completed, the form should be given to the Funeral Director.
Cardiac pacemakers or any radioactive implant must be removed prior to cremation by the Medical team whom may be assisted by the Mortuary Staff.
Mortuary staff are not responsible for arranging medical certificates for cremation.

Ref: Q-Pulse IM-MR-025 Policy on the completion of the Death Notification Form (Death Registration) at GUH updated July 2022.
There are also several other policies/SOP's in progress currently with Vivian, Helen and Anne that can be referenced here as needed.

11. Immunology Department (Supraregional Service)

11.1 Department Profile

The Department of Immunology provides a comprehensive range of tests for the immunological investigation of patients. Our aim is to provide the highest quality of service and prompt delivery of accurate results, backed up by specialist medical and scientific expertise. Where specific tests are not available locally we will refer samples on to colleagues in other centres. The department is happy to assist in the interpretation of patients test results.
Interpretative comments will be added to reports where appropriate. Clinical referrals are welcome and opinions will be given at in-patient consultations or at the immunology clinic (for allergy and immunodeficiency). The Department of Immunology is accredited by the Irish National Accreditation Board (INAB) in compliance with the International Standard ISO/IEC 15189 (Registration number 255MT). All tests referred to external laboratory for testing are outside of our scope of accreditation.

A list of tests offered is described in Section 16. There is a brief summary of the clinical application of each test which is intended to be helpful but is not intended to replace discussion of individual patients. For urgent, complex or specialised tests please discuss with medical / scientific staff before sending the specimen.

Routine serum specimens are stored for two weeks. Subject to individual stability, further immunology tests on a serum specimen that is already in the immunology laboratory can be requested by contacting the department.

Turnaround time (TAT) is defined as the time from receipt of specimen in the Immunology laboratory until the result is reported either in the LIS or by phone. TAT is affected when there are excessive demands for urgent assays. TAT is based on 'working days'. The Immunology department does not provide a weekend or out of hours service. TATs are based on 95% confidence intervals.

11.2 Urgent Requests

The Department of Immunology does not provide an emergency on-call service to its users; i.e. non-deferrable tests necessary for decisions regarding patient treatment. All samples received are processed as routine work however, requests may be deemed urgent if the requesting clinician contacts the department directly.

Requests which may considered urgent include ANCA and GBM. All other requests marked 'urgent' are processed at the discretion of the Immunology department.

The transport of the urgent specimen should be as promptly as possible. Specimens from outside hospital ideally should not be delivered to central reception. Samples from within the hospital should not enter the pneumatic chute system, as this may delay their delivery to the lab.

The Department of Immunology accepts responsibility for the urgent request once it has been received at the laboratory.

11.3 Guidelines for Requesting Allergy Tests

Allergen Specific IgE Tests

We receive several requests for 'allergen specific IgE or RAST' without stating which individual allergen test is required. There are very many individual tests available and it is not possible for the laboratory to determine what individual specific IgE tests are required, particularly for food allergens. The individual allergen must be selected by the requesting doctor to confirm their suspicion obtained from the clinical history.
Specific IgE tests are tests of sensitisation which are used to support a clinical diagnosis of allergy. Specific IgE testing provides similar, although not identical, information to Skin Prick Testing, but may be particularly valuable in assessing some groups of patients (patients taking antihistamines, extensive eczema/dermographism). Specific IgE tests are expensive.

Refer to the Advice Note(s) Indications for Measurement for -Total IgE and -Allergen Specific IgE (located on https://www.hse.ie/eng/about/who/cspd/lsr/resources/advice.html) for provision of indications for allergy testing in GP and non-Specialist settings.

Anaphylaxis

Please phone to discuss.
Blood samples (serum) for Tryptase (marker of mast cell degranulation) should be taken immediately after resuscitation (sample 1), after 1-2 hours (sample 2) and a baseline sample at 24 hours (sample 3). It peaks within 1 hour but can be raised for up to 6 hours.

Food Allergy

Relatively few foods account for most IgE mediated allergic reactions in both children and adults.
In children these include egg, milk, peanut, tree nuts, kiwi.
In adults these include peanut, tree nuts, fish, shellfish, fruits.
Seeds (e.g. sesame) and fruit (e.g. kiwi) are emerging allergens.

Asthma and Rhinitis

In asthma and rhinitis testing for inhalant allergens is helpful (usually by skin testing)
House dust mite, grass pollen, tree pollen plus cat or dog
Plus other animals or moulds (alternaria, cladosporium, aspergillus) if clinically relevant.
Individual testing is more useful than panels in selecting allergens to avoid.

Pitfalls in allergen specific IgE testing:
Screening is not useful and is not a substitute for a properly taken clinical history.
Allergen specific IgE tests yield information on sensitisation, which is not always equivalent to clinical allergy.
When used indiscriminately specific IgE tests may be associated with false positive results. False negative results may occur- but these are rare.
In atopic eczema total IgE is often markedly elevated in widespread disease and specific IgE may be present at high level to allergens that cause no overt symptoms. In that situation positive specific IgE results therefore need careful interpretation.
For certain labile allergens (e.g. fresh fruit such as kiwi) the specific IgE has lower sensitivity (55%), whereas Skin Prick testing with fresh fruit is more sensitive (90%).

Total IgE

Total IgE is of limited value and should not be used as a screening test.
A total IgE within the normal range does not exclude clinical allergy. Patients may have a normal total IgE and have clinically relevant allergen specific IgE.
Total IgE is essential in ABPA, and is also used for asthma patients being considered for omalizumab (anti-IgE) treatment.

Who not to test

Additionally Specific IgE tests cannot help investigate non-allergic food intolerance, coeliac disease or non-specific complaints such as headache.
There are no specific IgE tests to additives or colours.
Specific IgE cannot help investigate contact allergic dermatitis (patch testing by a dermatologist may be of value).
Specific IgE tests are not helpful in the investigation of chronic urticaria.

11.4 Guidelines for Requesting Tests for Autoimmune Disease

Requests for unspecified 'autoantibody screens' are discouraged. Clinicians should ask for specific autoantibody tests relevant to the clinical picture. If in doubt please contact the clinical immunologist / specialist registrar.

Coeliac disease

IgA anti-tissue transglutaminase antibodies (tTg) or IgA anti-endomysial antibodies are found in active disease, and can be used to monitor compliance with treatment. IgA anti-tTG is used as the initial screening test (more sensitive) and only positive results are confirmed once by IgA anti-endomysial testing (more specific).
As part of quality assurance the test method can detect samples with absent IgA that may cause false negative results. In patients with selective IgA deficiency i.e. undetectable levels of IgA the **IgG** anti-tTG assay is performed. NICE Guidelines, 2016 state that 'Testing for Coeliac disease is only accurate if the person continues to follow a gluten-containing diet during the testing period. Some gluten should be eaten in more than one meal every day for a minimum of 6 weeks before testing'.

Pernicious anaemia

Antibodies to gastric parietal cells are associated with type A atrophic gastritis and are found in up to 90% of patients with early stage pernicious anaemia. The frequency declines with disease progression. They also occur in 3% of the normal population (the incidence rising with increasing age).
Antibodies to intrinsic factor are highly specific for pernicious anaemia and are found in 50-75% of patients. They are rarely seen in healthy individuals.

Anti-mitochondrial antibodies

Antimitochondrial antibodies occur in 95% of patients with primary biliary cholangitis (PBC). There are several subtypes of anti-mitochondrial antibodies. The M2 antibody subtype (anti- pyruvate dehydrogenase complex antibody) is highly specific for PBC and its presence in 'healthy' individuals is associated with a long-term risk of PBC.

Anti-Smooth muscle antibodies

Smooth muscle antibodies (anti-actin) occur in autoimmune hepatitis but smooth muscle antibodies, particularly at low titres may occur also in other causes of liver disease, including viral hepatitis.

Anti-LKM-1 antibodies

LKM-1 antibodies are associated with Type 2 Autoimmune Hepatitis. They may also be found in Hepatitis C.

In addition serum protein electrophoresis and quantitation of the levels of IgG, IgA and IgM should be performed. Autoimmune Hepatitis may be associated with polyclonal hypergammaglobulinemia. Primary Biliary Cirrhosis may be associated with elevated IgM. Primary sclerosing cholangitis has no definitive serological markers, but may be associated with ANCA (anti-neutrophil cytoplasmic antibodies) or ANA or SMA.

Further testing for other rare antibodies associated with autoimmune liver disease or primary biliary cirrhosis including SLA/LP, LC-1, gp210, PML and Sp100 antibodies, are available on request.

11.5 Endocrine Disorders

Thyroid

The level of antibodies to thyroid peroxidase (TPO) are raised in autoimmune thyroiditis (90% of hypo-, >60% of hyper) but also at low titres in post-viral and post-partum thyroiditis. They are rarely elevated in thyroid neoplasia/nodules/cysts, but their presence does not exclude these conditions. Anti-TSH receptor antibodies are highly sensitive for the diagnosis of Grave's hyperthyroidism and related thyroid eye disease but can also be present in some individuals with Hashimoto's thyroiditis.

Adrenal failure / Gonadal failure

Antibodies to steroid producing cells of the adrenal cortex are associated with autoimmune Addison's disease. There may also be antibodies to steroid producing cells of ovary and testis. A small proportion of cases of premature menopause are due to autoimmune oophoritis. Some of these patients also have adrenal failure - the same tests are done for both.

Diabetes Mellitus

Islet cell antibodies may be found early in the course of type I (autoimmune) Diabetes Mellitus, but gradually disappear with time. They are not found in type II diabetes.
Anti-GAD (glutamic acid decarboxylase) antibodies occur in up to 80% of type I Diabetes but may also occur in Stiff Person Syndrome.
For newly diagnosed type 1 diabetes it is recommended to request anti-GAD, anti-IA2 anti-ZnT8 antibodies.

11.6 Dermatology

Pemphigus / Pemphigoid

Antibodies are found to the epidermal intercellular "cement" / desmosome in all forms of pemphigus, and to the epidermal basement membrane in bullous pemphigoid.

11.7 Autoimmune Rheumatic and Renal Diseases

Rheumatoid Factor

Although present in 65% of Rheumatoid arthritis patients it is a non-specific test and is positive in a variety of conditions (particularly at low titre) including viral infections, chronic bacterial infections, connective tissue diseases and lymphoid malignancy. The prevalence of rheumatoid factor increases with age. It is not of value in the laboratory monitoring of disease activity; CRP should be used.

Anti-CCP antibodies

Anti-CCP (anti-cyclic citrullinated peptide) antibodies have a sensitivity of 68% and specificity of 95% for rheumatoid arthritis. Compared to rheumatoid factor it occurs less frequently in healthy individuals (1%), after infections (1%) and in other connective tissue disorders (5%). Anti-CCP antibodies are present in early rheumatoid arthritis and appear to predict the development of erosive disease.

Antinuclear antibody (ANA)

Antinuclear antibodies are found in connective tissue diseases, other autoimmune diseases, but also occur in chronic infections, malignancy and in normal individuals. Approximately 5-10% of normal individuals have a positive ANA at a screening dilution of 1/80 with the prevalence of ANA increasing with age. If a positive ANA is found, further characterisation is dependent on the clinical history, titre and immunofluorescent pattern. Low autoantibody titres are usually not significant. ANA is most useful in the diagnosis of SLE, Scleroderma, Sjogrens Syndrome, Inflammatory Myositis, Discoid Lupus, Mixed Connective Tissue Disease, Autoimmune hepatitis.

ANA testing from General Practitioners for autoimmune rheumatic diseases is performed using the **Connective Tissue Disease (CTD) screen**. The CTD Screen is an automated method for the detection of anti-nuclear antibodies (ANA) in autoimmune rheumatic diseases such as SLE, mixed connective tissue disease, Sjogrens syndrome, Scleroderma and Myositis. The CTD Screen tests for anti-RNP, Sm, Ro, La, centromere B, Scl-70, Jo-1, Fibrillarin, RNA polymerase III, Ribosomal-P, PM-Scl, PCNA, Mi-2 and anti-dsDNA. Positive CTD screen results will have further testing for ANA (by indirect immunofluorescence), anti-ENA and anti-dsDNA where appropriate.

Refer to the Advice Note Assessment of Autoantibodies against Nuclear Antigens ANA (located on https://www.hse.ie/eng/about/who/cspd/lsr/resources/advice.html) for provision of indications for testing.

Cytoplasmic antibodies detected on ANA testing

Cytoplasmic staining is detected by the same immunofluorescence test as ANA. However, a positive cytoplasmic staining is NOT a positive ANA. Some antibodies to cytoplasmic components have clinical significance whereas the relevance of others is unknown. Antibodies to ribosomes may accompany ANA in SLE. Mitochondrial patterns are associated with Primary Biliary Cholangitis. In polymyositis anti-Jo-1 antibodies have a discrete cytoplasmic speckled pattern. Cytoskeletal patterns can also be distinguished but are mainly non-specific.

Double stranded DNA (dsDNA)

Antibodies against dsDNA are present in 60% of SLE patients and constitute one of eleven ACR criteria for diagnosis. In most instances it is pointless to request antibodies to dsDNA either without knowing the ANA result or if the ANA is negative. If the ANA is negative dsDNA antibodies are rarely indicated unless the clinical picture is exceptional.

Histone

Antibodies are found in 18-50% of patients with SLE and in 95% of patients with drug induced SLE. If the ANA is negative antihistone antibodies are rarely indicated.

Extractable Nuclear Antigens (ENA)

Antibodies to extractable nuclear antigens are useful in the classification of clinical subsets of connective tissue diseases and in providing prognostic information. If the ANA is negative ENAs are rarely indicated, unless the clinical picture is strongly suggestive of a connective tissue disease. Further characterisation may be necessary in scleroderma and myositis, pending the ANA pattern.

Tests are first performed as a screen with further characterisation (Sm, RNP, Ro, La, Scl-70, Jo-1) if positive. An extended ENA profile is available for patients with connective tissue diseases, scleroderma and myositis.

ENA	ANA Pattern	Disease Association
Ro (SSA)	Speckled	Sjogrens (60-80%) SLE (35%) Subacute cutaneous lupus Scleroderma (10-15%)
Ro 52	Speckled	Connective tissue disease, Myositis
La (SSB)	Speckled	Sjogrens (50%) SLE (15%)
Sm (Smith)	Speckled	SLE (highly specific, 15-30%)
RNP	Speckled	MCTD (100%) SLE (40-60%) Scleroderma (10-15%)
Scl-70 (anti-topoisomerase-1)	Homogenous/intense speckling + nucleolar	Scleroderma (25%)
Jo-1	Cytoplasmic speckled	Myositis/Lung fibrosis (30%)
PL-7	Cytoplasmic speckled	Myositis/Lung fibrosis (3-5%)
PL-12	Cytoplasmic speckled	Myositis/Lung fibrosis (3%)
EJ	Cytoplasmic speckled	Myositis/Lung fibrosis
OJ	Cytoplasmic speckled	Myositis/Lung fibrosis
PM-Scl (75 & 100)	Fine speckled + nucleolar	Polymyositis / scleroderma overlap (8-12%)
Fibrillarin	Clumpy nucleolar	Scleroderma
RNA polymerase III	Fine speckled ± nucleolar	Scleroderma (15-20%)
Th/To	Nucleolar	Scleroderma (4%)
Nor 90	Nucleolar with mitotic dots	Scleroderma
Ku	Homogenous + nucleolar	Polymyositis/Scleroderma overlap
SRP	Cytoplasmic speckled	Immune Mediated Necrotising Myopathy
Mi-2 alpha and Beta	Fine speckled	Myositis
PCNA	Cell cycle staining	SLE
TIF1-gamma		Juvenile dermatomyositis (15-20%), Adult dermatomyositis including malignancy associated DM
MDA5		Dermatomyositis/Lung fibrosis, DM skin changes without myositis, Juvenile Dermatomyositis (7.4%)
NXP2		Juvenile Dermatomyositis
SAE1		Dermatomyositis
CN-1A		Inclusion Body Myositis

ENA	ANA Pattern	Disease Association
HMGCR		Immune Mediated Necrotising Myopathy (with or without Statin exposure)
Nucleosomes	Homogenous	SLE
Histones	Homogenous	Drug-induced lupus
Ribosomal P- Protein	Cytoplasmic speckled	SLE
Centromere	Centromere	Limited Scleroderma

Anti-neutrophil Cytoplasmic Antibody (ANCA)

ANCA are used to diagnose and monitor inflammatory activity in small vessel vasculitis, namely Granulomatosis with Polyangiitis (GPA) (formerly Wegeners Granulomatosis), Microscopic Polyangiitis and its renal limited variant (pauciimmune cresentic glomerulonephritis) and Churg Strauss Syndrome (eosinophilic GPA).
Positive C-ANCA (cytoplasmic) and P-ANCA (perinuclear) are further tested for specificity to PR3 (proteinase-3) and MPO (myeloperoxidase).
C-ANCA PR3+, C-ANCA MPO+ or P-ANCA MPO+ occur in 80% of Wegeners Granulomatosis, Microscopic Polyangiitis and in 60% of Churg Strauss Syndrome.
P-ANCA with specificities other than MPO occur in inflammatory bowel disease, sclerosing cholangitis, rheumatoid arthritis and other autoimmune diseases where its clinical significance is unclear. Atypical C-ANCA are not clinically significant. Atypical ANCA are found in some cases of drug induced vasculitis but are otherwise of uncertain clinical significance.

Anti-glomerular basement membrane (anti-GBM) antibodies

Anti-glomerular basement membrane (anti-GBM) antibodies occur in >90% of patients with GBM (Goodpasture's) disease.

Anti-phospholipid syndrome

Antiphospholipid syndrome is present when at least one clinical and one laboratory criteria are met.
Clinical criteria:

- At least one episode of vascular thrombosis affecting any organ or tissue (excluding superficial thrombosis).
- Pregnancy morbidity 1 of 3: One or more unexplained deaths at or beyond 10 weeks gestation. One or more premature births before the 34th weeks of gestation because of eclampsia or severe pre-eclampsia OR recognised features of placental insufficiency.
- Three or more unexplained consecutive abortions before 10 weeks gestation.

Laboratory criteria: IgG and/or IgM cardiolipin and/or anti- β2-glycoprotein I antibodies in medium/high titre on two separate occasions at least twelve weeks apart.
Lupus anticoagulant (performed in haematology): positive on two occasions at least twelve weeks apart.
Cardiolipin antibodies may be found in other autoimmune disorders, particularly SLE. Transient positive results may be found after infections.

11.8 Neurology

Myasthenia Gravis and Myasthenic Syndromes

Impaired neurotransmission in MG is caused by the presence of antibodies to the acetylcholine receptor (AChR). They are detectable in 90% of MG patients. They may be undetectable in 40% of patients with ocular myasthenia. Antibodies to striated muscle are present in 30% of patients with MG - and 60% of these will also have thymoma. Lambert-Eaton-Myasthenic Syndrome is associated with antibodies to voltage gated calcium channels (VGCC).

Peripheral Neuropathy

Certain neuro-specific autoantibodies are associated with neuropathies incorporating a range of antiglycolipid and antiglycoprotein antibodies (e.g. antiganglioside antibodies). These tests are only available after consultation with the neurologist and are referred directly to a reference laboratory.

Paraneoplastic syndromes
Specific paraneoplastic neurological syndromes may be associated with anti-Hu, anti-Yo, anti-Ri antibodies, anti-amphiphysin or anti-CV2/CRMP5.

11.9 Guidelines for Requesting Immunochemistry Tests

Complement

Low C3, Low C4	Low C3, Normal C4	Normal C3, Low C4
Severe sepsis	Post streptococcal GN	Genetic deficiency
SLE (active)	C3 nephritic factor	SLE
Liver cirrhosis / failure	SBE	Hereditary angioedema
Malnutrition	Sepsis	Hypocomplementemic urticarial vasculitis
		Mixed cryoglobulinemia

Increased complement levels are associated with acute phase responses. Normal levels may reflect increased production as well as consumption.
Serum C3 levels may remain low in some forms of membranoproliferative glomerulonephritis, due to the circulating autoantibody C3 nephritic factor.

Hereditary angio-oedema (C1INH deficiency)

Recurrent abdominal pain and/or deep subcutaneous swellings (angioedema) without urticaria (particularly occurring after minor trauma), often with family history, may indicate HAE. In type 1 HAE (85%) C1 esterase inhibitor is low. Uncommonly there may be normal C1INH level is normal with defective functional activity. C4 is low during attacks of HAE.

Acquired C1INH deficiency
Deficiency/ Consumption/ Inactivation of C1INH may occur in SLE and lymphoproliferative disease. This may lead to episodes of angio-oedema as with the inherited form. C1q is low in acquired C1INH deficiency but usually normal in HAE.

Complement Deficiencies
CH100 and CH100A test the integrity of the classical and alternate pathways of complement activation. Their use is limited to the investigation of suspected complement deficiencies. Early classical pathway complement component deficiencies are associated with SLE and recurring bacterial infections. Deficiencies in the alternative and terminal pathways are associated with recurring neisserial (meningococcal) infection. To avoid misinterpretation due to the effects of complement consumption by immune complex formation or infection, the test should be requested when the patient has recovered.

Immunoglobulins
IgG, IgA, IgM, and Serum Protein Electrophoresis
Essential in the investigation of suspected immunodeficiency, lymphoproliferative disease and myeloma. Abnormally elevated levels in the absence of a monoclonal band i.e. polyclonal hypergammaglobulinemia may occur in chronic infections / inflammatory conditions, liver disease and connective tissues disorders (e.g. Sjogren's syndrome and SLE).
If a monoclonal band (paraprotein) is detected on electrophoresis it is quantified and immunofixation is then used to define the heavy chain (IgG, IgA, IgM, IgD, IgE) and light chain (kappa or lambda) type. Malignant paraproteins are usually of high concentration (>15g/L) associated with low levels of the non-paraprotein immunoglobulins and the presence of free monoclonal light chains in the urine (Bence Jones proteins). They occur in myeloma and lymphoproliferative disorders. Monoclonal Gammopathies of unknown significance (MGUS) are paraproteins which do not have the typical features described above, but long-term follow up has shown that 20% may develop myeloma over a 20 year period.
Paraprotein quantitation is used to monitor disease progression and response to therapy. The technique used to quantitate monoclonal bands is different to that used to measure the total immunoglobulins (IgG, IgA, IgM) and results are not directly comparable.

Urinary Free Light Chains (Bence Jones Proteins)

Urine protein electrophoresis for Bence Jones proteins (Urine free light chains) should be requested in all patients with suspected paraproteinemia because 20% of myeloma patients do not have a detectable monoclonal band in the serum. Early morning specimens are preferred. For disease monitoring a 24-hour collection is preferred.

Serum Free kappa and lambda Light Chains
Abnormal serum free light chains are useful in monitoring the response to treatment in multiple myeloma and AL amyloidosis. In MGUS, an abnormal free kappa/lambda light chain ratio may help in prediction of the long term risk of progression to malignancy. However, serum and urine protein electrophoresis and immunofixation remain the first line of investigation for monoclonal disorders.

Beta 2 Microglobulin
Elevated Beta 2 microglobulin occurs in myeloma (where it is a marker of tumour load) as well as lymphoma and HIV. Interpretation may be complex as levels are also increased in renal failure.

Cryoglobulins
Cryoglobulins are immunoglobulins that precipitate and form complexes at low temperature. Patients with cryoglobulinemia may present with vasculitis. An unexpected rheumatoid factor with low C4 may indicate the presence of a cryoglobulin. Detection of cryoglobulins is not possible on routinely submitted samples – the sample must be transported in a flask and arrive at the lab at 37 C. Please note the importance of following the correct procedure for taking and transporting the samples cannot be overestimated – failure to do so can result in a false negative result

Guidance for collection of samples for Cryoglobulin:

Collection of blood for cryoglobulin analysis MUST be pre-arranged directly with the Immunology laboratory. Pre-warmed sample collection tubes and a flask will be provided on request

- 10ml of blood collected into one red-topped clotted sample tube
- 4 ml of blood collected into one purple-topped EDTA tube

All tubes **MUST** be kept between 37C – 41C in the thermos flask and be delivered to the laboratory **IMMEDIATELY**.
Samples arriving in the lab below 37C or above 41C will be rejected.

Note: Samples must not be taken from arterial or heparinized lines. Samples cannot be shared with other tests.
Yellow top tubes are not recommended.

If detected, the cryoglobulins are quantified and typed by immunofixation.
There are three types of cryoglobulin: **–**
Type 1: Monoclonal
Type 2: Mixed monoclonal IgM rheumatoid factor with polyclonal IgG
Type 3: Mixed polyclonal IgM rheumatoid factor with polyclonal IgG

IgG subclasses (IgG 1, 2, 3)
The measurement of IgG subclasses is of limited value and should only be considered in the context of identifying primary immunodeficiency. Patients with IgA deficiency sometimes have accompanying IgG subclass deficiency.

IgG subclasses (IgG4)
The measurement of IgG4 levels is indicated in the investigation of IgG4 related disease.

Functional antibodies
The quantitative assessment of IgG to tetanus toxoid and pneumococcal capsular polysaccharide pre and post vaccination is of value in the investigation of immunodeficiency. Functional antibody testing should only be requested after discussion with the immunology medical staff.

CSF Oligoclonal Bands
Oligoclonal banding is defined as two or more discrete immunoglobulin bands in the CSF that are not matched by corresponding bands in the accompanying serum sample and therefore reflects IgG synthesis within the CNS. A positive result supports a diagnosis of multiple sclerosis but may also be observed in a variety of other infectious and inflammatory diseases of the CNS.

Paired CSF and serum samples must be submitted.

Serum Amyloid A

Serum amyloid A (SAA) is an acute phase protein that increases in parallel with CRP but with increased sensitivity.

Haptoglobin

Decreased serum haptoglobin is seen in any clinical situation where there is significant intravascular haemolysis as well as some disorders with increased red cell fragility. Elevated levels may occur as part of an acute phase response.

Caeruloplasmin

Decreased levels of caeruloplasmin are seen in most cases of Wilson's disease. As it is an acute phase protein, occasionally normal levels may occur transiently where there is an inflammatory stimulus to the acute phase response. Levels are also reduced in severe liver disease and severe malabsorbtive syndromes.

Alpha-1-antitrypsin

The quantitation of AAT is important in the evaluation of emphysema and neonatal and adult liver disease where low concentrations may have diagnostic importance. AAT is a slow acute phase response and may be falsely normal during infections. AAT genetic status (PI phenotyping) is performed in all cases of deficiency where the quantitative result is less than the age related normal range as well as in all children with liver disease.

11.10 Guidelines for Investigation of Immunodeficiency

Please phone a Consultant Immunologist or SPR to discuss the investigation of recurrent unusual infection. The nature of the organism, the site severity and frequency of infection may give clues into the nature of the immune defect. Investigation is required in the following circumstances:
Family history of immunodeficiency
Infant or young child with failure to thrive, opportunistic infections, persistent infections with low virulent organisms, severe diarrhoea, unusual extensive skin rashes
Hepatosplenomegaly
Recurring/persisting sinopulmonary infections
Recurring skin infections, abscesses or periodontitis
Recurring meningitis.

Screening tests for primary immunodeficiency should include FBC and differential, serum immunoglobulins, occasionally IgG subclasses and functional IgG response to tetanus and pneumovax, and lymphocyte subsets (CD4 and CD8 T cells, CD19 B cells, CD16/56 NK cells). Further tests should be directed towards the suspected arm of defence considered deficient, and include tests of neutrophil function and the measurement of total haemolytic complement CH100, and the alternative complement pathway CH100A. Always consider HIV as a cause of immunodeficiency.

CD4 counts

CD4 monitoring in patients with HIV is a marker of disease progression and response to therapy. Requests for CD4 counts as a "surrogate marker" of HIV infection will be refused.

Lymphocyte Subsets (CD4 and CD8 T cells, CD19 B cells, CD16/56 NK cells)

Suspected cases of childhood T cell/ combined immunodeficiency should be regarded as urgent and the laboratory contacted as soon as possible.

Neutrophil Disorders

Indicated in the investigation of severe recurrent skin infections, chronic gingivitis, recurrent deep seated bacterial and fungal infections.
Other referral tests are available and require prior discussion with immunology medical staff.

11.11 Therapeutic Drug Monitoring

Biologic therapies, including the anti-tumor necrosis factor (anti-TNF) agents (Infliximab, Adalimumab), the adhesion molecule inhibitors (Vedolizumab), and the p-40 interleukin-12/23 inhibitor Ustekinumab are effective treatments for patients with moderate to severe inflammatory bowel disease (IBD). Nevertheless, up to 1/3 of patients with Crohn's disease (CD) and ulcerative colitis (UC) show primary non-response (PNR) to biologic therapies and up to 50% of patients after an initial clinical response stop therapy either for secondary loss of response (SLR) or a serious adverse event.
Drug trough levels and anti-drug antibodies enable the clinician, based on patient's clinical status, to make rational therapeutic decisions in different clinical situations:

- Reactive TDM: Guide therapy after a treatment failure and follow-up therapeutic adjustment (switch or optimization). Reactive TDM should be performed in patients with primary non-response or secondary loss of response to biologic therapy.
- Proactive TDM: Proactive TDM should be performed post induction for patients treated with anti-TNF therapy. Proactive TDM should be performed at least once during maintenance therapy for patients treated with anti-TNF therapy
- Guides treatment de-escalation for patients in remission.
- When infliximab de-escalation (dose reduction) is considered in patients in remission, proactive TDM both prior to and after de-escalation should be performed.
- Reduce treatment costs by implementing a rational decision-making patient care management
- Reactive TDM has been proven more cost-effective than empiric anti-TNF therapy optimization.
- Decrease the risk of allergic reactions during infusion or other adverse effects

The department of Immunology provides testing for trough levels and antibodies (where indicated) for the following biological drugs: Infliximab, Vedolizumab and Adalimumab. Ustekinumab analysis is referred externally for testing.

11.12 Interferon Gamma Release Assay (IGRA/Quantiferon)

Quantiferon TB Gold is an indirect test for latent Mycobacterium Tuberculosis infection (LTBI) and M. Tuberculosis complex infection. Latent Tuberculosis (LTBI) is an asymptomatic condition that may progress to active Tuberculosis in some individuals. The primary goal for the diagnosis of LTBI is to initiate medical treatment to prevent progression to active disease.

Testing for LTBI is indicated when the risk of developing disease from latent infection (if present) is increased e.g. Recent close contact of TB, immunosuppression, HIV infection, before commencing immunosuppression with biologic drugs that increase the risk of TB reactivation (e.g. anti-TNF), and occupational health screening for healthcare workers.

The Interferon-Gamma Release Assay (IGRA/Quantiferon) measures the level of the cytokine, interferon-gamma (IFN-gamma) released by patient lymphocytes in a cell-mediated immune response to mycobacterial proteins. These proteins include ESAT-6, CFP-10 and TB7.7, and are absent from all BCG strains and most non-tuberculous mycobacteria. Although the assay quantitatively detects the IFN-gamma, the interpretation of the result for a single patient is strictly qualitative.

The IGRA/Quantiferon assay requires specialised blood collection tubes. These tubes (set of 4) are available for collection from the Immunology laboratory. Correct handling of the blood collection tubes is essential.

A negative Interferon-Gamma Release Assay (IGRA) result does not preclude the possibility of M. tuberculosis infection. False negatives can be due to incorrect handling of the blood collection tubes, the stage of the infection (e.g. sample taken prior to development of cellular immune response), or co-morbid conditions which affect immune function.

All positive results should be followed by further medical evaluation.

If the result is indeterminate for TB antigen responsiveness, this may be related to a wide variety of factors including immunosuppressant medication or low lymphocyte count. A repeat sample will be requested by our laboratory. A subsequent second indeterminate result may benefit from discussion with the clinical immunology or TB teams.

NIL (IU/mL)	TB1 minus NIL (IU/mL)	TB2 minus NIL (IU/mL)	Mitogen minus NIL (IU/mL)	Qualitative Result	Interpretation
≤ 8.0	≥ 0.35 and ≥ 25% of Nil	Any	Any	Positive	LTBI likely
	Any	≥ 0.35 and ≥ 25% of Nil			
	< 0.35 OR ≥ 0.35 and < 25% of Nil	< 0.35 OR ≥ 0.35 and < 25% of Nil	≥ 0.5	Negative	LTBI Not Likely
	< 0.35 OR ≥ 0.35 and < 25% of Nil	< 0.35 OR ≥ 0.35 and < 25% of Nil	<0.5	Indeterminate	Likelihood of LTBI cannot be determined
≥ 8.0	Any				

Instructions for collection of samples for Quantiferon Analysis

- Patient samples are collected using the **Quantiferon-TB Gold Plus Blood Collection Tubes**; A four tube set containing; Nil, TB1, TB2 and Mitogen tubes.

- Sample tubes are available on request from the Immunology laboratory and should be stored at room temperature.
- Collect 1ml of blood into each tune in the following order: **Grey, Green, Yellow, Purple.**
- Tubes must be filled to the black fill line (1ml). Under or over filling may lead to erroneous results.
- Immediately after filling, shake tubes 10 times just firmly enough to ensure the entire inner surface of tube is coated in blood, to dissolve antigens on tube wall. Caution: Over-energetic shaking may cause gel disruption and could lead to abhorrent results.
- Complete the Quantiferon TB (IGRA) Request form (available from the Immunology laboratory).
- **NOTE**: It is important to record the date and time of collection.
- **NOTE: Samples must be received at the Immunology laboratory within 16 hours of collection Monday to Thursday only before 5pm.**

11.13 Guidelines relating to Genetic Referrals

Genetic testing is not performed in the Immunology laboratory. However, the department does act as a referral service for some molecular and cytogenetic referral requests on blood samples. In most cases genetic reports are issued directly to the requesting clinician. Genetic testing is not covered under the department's scope of accreditation to ISO 15189. Details for the most common genetic referrals dispatched via Immunology are included in the Alphabetic Test Directory section of this manual. Refer to the genetic laboratories' user guides for full details relating to sample and request form requirements and turnaround times for testing.

Cytogenetic and molecular genetic testing by the Department of Clinical Genetics (DCG), Children's Health Ireland (CHI), Crumlin: refer to www.childrenshealthireland.ie.

It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully.
Genetic reports are issued directly to the clinician by DCG.

Cytogenetic testing (karyotyping) by Eurofins Biomnis Dublin (Monday to Friday service), refer to https://www.eurofins.ie/biomnis/test-information/test-request-forms for request form and sample requirements. The Immunology Dept. issues a copy of Eurofins Biomnis genetic report to the requesting clinician.

Haemochromatosis genetic testing by Eurofins-Biomnis Dublin; Eurofins-Biomnis Haemochromatosis genetic report is issued to the Clinician by Immunology GUH. Paper report issued only - results not available on Healthlinks.

Molecular Genetic testing for Facioscapulohumeral Dystrophy (FSHD) by Bristol Genetics Laboratory, Southmead Hospital, Bristol, BS10 5NB, UK : refer to https://www.nbt.nhs.uk/severn-pathology/pathology-services/bristol-genetics-laboratory-bgl/bgl-services Genetic report issued directly by Bristol to the requesting clinician.

Endocrine/Metabolic/select rare disease molecular genetics requests are processed in Clinical Biochemistry (e.g. Endocrine neoplasia/parathyroid/familial hypercholesterolaemia/Fabrys/Gauchers). Request forms are available on GUH Useful resources in the Biochemistry folder or alternatively, please contact a member of the clinical team for advice.

12. Haematology Laboratory

12.1 Department Profile

The Department of Haematology is a consultant led service which includes scientific, clerical and medical, who participate in undergraduate and graduate teaching programmes, research, clinical trials, case conferences, ward rounds and clinics. It provides services to Galway University Hospitals, Mayo University Hospital, Roscommon University Hospital, General Practitioners, Community Care, and Public health in the counties of Galway, Mayo and Roscommon. In addition the Haematology Laboratory is a regional centre for a broad range of specialized tests which is supported by a clinical, advisory and interpretative service.

The Haematology Laboratory provides diagnostic investigations in general Haematology, routine and specialized Coagulation, Haematinics, Flowcytometry and Haemoglobinopathy screening. Approximately 3,000 requests for routine tests are received in the Haematology Laboratory every day and the Laboratory also performs other miscellaneous specialized tests that may be arranged through a Consultant Haematologist or Senior Specialist Registrar.
The Haematology Laboratory is accredited by the Royal College of Pathologists for specialized training in Haematology and also by the Academy of Medical Laboratory Science for the training of Medical Scientists. Medical scientists are now regulated by CORU. In addition, the Haematology Laboratory is accredited by the Irish National Accreditation Board (INAB) in compliance with the International Standard ISO15189 (Registration number 239MT). The Laboratory has an Internal Quality Assurance system and continues to participate in national and international quality assessment schemes.

12.2 Availability of Clinical Advice and Interpretation

Galway University hospital is a busy level 4 hospital with a wide range of specialities on site including Medicine, Surgery, Obstetrics, Paediatrics and Neonates. Consequently, the Consultant Haematologists at Galway University Hospital provide a clinical advisory service to a wide variety of specialities and General Practice.

Haematology – Consultant Haematologists at Galway University Hospital provide clinical advice and interpretation of results to facilitate the diagnosis, treatment and management of haematological diseases to Galway University Hospital, Merlin Park University Hospital, Portiuncula University Hospital, Mayo University Hospital and Roscommon University Hospital. Regular multidisciplinary meetings are held to discuss complicated cases.

General Practice- a large part of the clinical advisory service involves communication of results to General Practitioners. This is done using a variety of methods including clinical and interpretive comments on blood film reports, as well as phone calls if and when required. This is carried out by the laboratory registrars in conjunction with the Consultant Haematologist on laboratory duty or the Consultant Haematologist on Call, depending on urgency.

Paediatrics- a clinical advisory service is provided to Paediatric patients. Emergency advice is provided on call in conjunction with Children's Hospital Ireland where required.

Neonatology- interpretation of normal and abnormal Haematology results, with advice on investigation of common problems including thrombocytopenia, neutropenia, anaemia and the diagnosis of bleeding disorders.

Obstetrics- a Clinical Obstetric Haematology advice service is provided to patients in Galway University Hospital, Portiuncula University Hospital and Mayo University Hospital. This includes but is not limited to patients with thrombocytopenia, anaemia including hereditary spherocytosis, sickle cell disease, thalassaemia and bleeding disorders. Advice is also provided for Obstetric Haematology Patients with respect to the diagnosis and treatment of Neonatal Alloimmune Thrombocytopenia, HELLP, SLE and other conditions that may present in pregnancy.

Interpretation of Coagulation investigations – Galway University Hospital is a Haemophilia Treatment Centre. Consultant Haematologists review all Factor Assays, von Willebrand's screens and Platelet Aggregation results to ensure appropriate interpretation and clinical follow up where required. Any unexpected or clinically

significant thrombophilia result is reviewed by a Consultant Haematologist and an interpretive comment applied.

Requesting of appropriate tests and subsequent application of the test results and interpretative guidance from the Department of Haematology must be applied to patient care by a clinician in the overall clinical context of the patient concerned.
For this reason services are accessible only by medical practitioners or other health care professionals acting on the recommendation of a medical practitioner. Printed reports are issued to medical practitioners. Verbal reports are provided when appropriate to medical practitioners.
Consultant Staff hold appointments in the National University of Ireland. The department actively supports and facilitates clinical and laboratory research projects.

Haematology Laboratory	**Phone Numbers**	
Specimen Reception	4377	
Laboratory Supplies	4377	Fax: 091 542881
Laboratory Office	4281	
General Haematology Laboratory	4419	
Routine Coagulation	4283	
Special Coagulation	4995	
Haematinics	4880	
Bone Marrow/Flow Cytometry	4284	
Special Haematology	4284	

Insert (091) 54 before extension number for direct access from outside.
The telephone enquiry service should be used for emergency enquiries only.

12.3 Out of Hours Service

An out of hours service operates outside normal hours for emergency work.

Monday-Friday	20:00 to 08:00 h the following day
Saturday	13:00 to 10.00 h the following day
Sunday/Bank Holiday	10:00 to 08:00 h the following day

Do not forward routine requests to the laboratory during on-call hours.

To contact staff out of hours
Post-midnight laboratory on-call personnel must be contacted via hospital switchboard (dial 9). Failure to do this may result in prolonged turnaround times for urgent requests.

12.4 Add on Test Requesting

Telephoned requests for add-on tests are accommodated provided the usual criteria for acceptance of the added test are met by the form and specimen in the laboratory. In instances where extra information is required the requesting Physician will need to send a completed request form to the haematology laboratory.

12.5 Haematology Laboratory Tests

Refer to the Test Directory of this manual (listed alphabetically within the Laboratory Medicine Test Directory) for a list of tests performed, the specimen required, turnaround time and other information regarding specimen collection.
Some tests may be performed only after prior arrangement with the laboratory. Where doubt exists, the appropriate laboratory should be consulted. Specialised Haematology and Coagulation tests are available at the discretion of Haematology team.

12.6 Reporting

Telephoned reports will be given in cases of urgency to an identified responsible person but not directly to the patient.
Faxed Reports for reasons of confidentiality it is the policy of GUH not to fax reports.

Copy reports will only be issued to persons other than the requesting clinician, when this is clearly indicated on the request form or on receipt of a written request.
Supplementary results such as morphologies will not reach the patients record until after the initial report is available. In the case of Health Links a second report is sent out at a later date.
Apex Results are available in the Laboratory information system (APEX) to HSE West Area Hospitals who use the laboratory service. Enquiries on lab results should be made through the "Ward Enquiry Function" of the laboratory information system (APEX). In addition, results can also be accessed by EVOLVE.
Hard copy results are delivered daily to both the acute hospitals and to the General Practitioners (Monday-Saturday). GPs' may receive results electronically via 'Healthlinks'.
Referral Laboratory Reports: The Haematology Laboratory will follow up on any referral test report not reported by the referral site within the defined turnaround times.
Analytical Failures: In the event of an urgent specimen being unsuitable for processing or where there is an analytical failure, the clinician will be informed by phone or through the Healthlink or Apex reporting system. A hard copy report will follow.
Reference ranges: Age and sex related ranges where applicable are quoted on the Haematology test report form.

12.7 Specimen Retention Policy

Routine full blood count, coagulation and haematinic samples will be stored for 2-3 days. Bone marrow slides are stored indefinitely.

12.8 Haematology Specimen Rejection Policy

Please refer to Request form and Sample Acceptance Criteria for detailed sample submission guidelines located under Use of the Laboratory section 3.0- Requests to the Laboratory. However the following specimens cannot be processed by the Haematology Laboratory:

Leaking specimen containers (infection risk)

Unlabelled specimens
Information on request form and specimen at variance with each other
Specimens not labelled or containing minimum acceptance criteria of full name plus date of birth or hospital number
Incorrect preservative/anticoagulant
Incorrectly filled specimens
Clotted FBC or Coag specimens
Specimens received not attached to speci-bag
Specialised tests rejected with no requesting consultant specified

Definitions

Turnaround time: Time from receipt of specimen in the Haematology Laboratory to the time of authorization of results.

In Progress: Analysis incomplete. Refer to particular test turnaround times in this manual.

Referral Laboratory: An external laboratory to which a sample submitted for a supplementary or confirmatory examination procedure and report.

Emergency on Call Service: Out of hours call service provided for emergency specimens.

Urgent: Samples accompanied by Urgent (Red Flash) forms are prioritized in the laboratory process and on authorization; results will be available on the Laboratory Information System. Urgent Specimen results are telephoned if the Laboratory receives a specific request to do so, or where test results are in the range as indicated for Telephoning by the Laboratories Standard Operating Procedures.

Request Forms:
GUH Emergency Request Form (LMDERF 001)
GUH Laboratory Request Form (LMDHRF 001)

GP Request Form (LMDGPRF 001)
Haematology Day Ward Request Form (GHAEM/F/021)
Bone Marrow Request Form (G HAEM/F/015) RL57a

13. Medical Microbiology Department

(Division of Clinical Microbiology)

13.1 Department Profile

The Division of Clinical Microbiology incorporates the Department of Medical Microbiology and the Department of Virology. The Department of Medical Microbiology comprises the clinical diagnostic laboratory and the Public Health Laboratory (PHL), and the GUH National Reference Laboratory Services. GUH National Reference Laboratory Services comprises the National *Salmonella, Shigella and Listeria* Reference Laboratory (NSSLRL) and the National Carbapenemase Producing Enterobacterales Reference Laboratory (NCPERL). The Division has a staff of more than 50 people including medical, scientific and clerical staff.

The Medical Microbiology Department in GUH provides a full diagnostic and advisory service for hospitals, General Practitioners and Community Care in the HSE Western area. Specialist Mycobacterium laboratory service is also extended to Sligo and Letterkenny University Hospitals. In the case of seriously ill patients or those with complex conditions a telephone discussion with medical staff may be important prior to samples being submitted or results being reported. The National Salmonella, Shigella and Listeria Reference Laboratory (NSSLRL) provides a national typing service for Salmonella, Shigella and Listeria isolates to clinical laboratories. The NSSLRL also types isolates from food and animal laboratories to enable detection of sources of human infection in the event of an outbreak.

The National Carbapenemase Producing Enterobacterales Reference Laboratory (CPERL) provides a national molecular testing service for isolates to clinical laboratories.
The Division is committed to delivery of an equitable and responsive service within the limits of the resources available. The Department of Medical Microbiology is accredited by the Irish National Accreditation Board (INAB) in compliance with the International Standard ISO/IEC 15189:2022 (Registration number 223MT). The Public Health Laboratory is accredited by INAB in compliance with ISO/IEC 17025 (Registration number 097T).

13.2 Access to Service

Requesting of appropriate tests and subsequent application of the test results and interpretive guidance from the Department of Medical Microbiology must be applied to patient care by a clinician in the overall clinical context of the patient concerned.
For this reason services are in general accessible only by medical practitioners or other health care professionals acting on the recommendation of a medical practitioner. Written reports are issued to medical practitioners. Verbal reports are provided to medical practitioners or in certain circumstances to other health care professionals. Please note that results of antibiotic sensitivity testing are often not reported in full (selective reporting). If a suitable antibiotic for a specific patient is not identifiable from a report you may be able to obtain additional test results by telephoning the laboratory.

It is not appropriate to instruct patients or their relatives / friends to telephone the department of Medical Microbiology for results. The Department cannot verify the identity of the caller and does not have a relationship with the patient to ensure that the result is properly understood and acted on.
The name and contact details of the medical practitioner requesting a test must be clearly legible on the request form. The medical practitioner signing the request form is responsible for ensuring that the test request is appropriate and that issues of consent to testing and privacy have been dealt with appropriately.
Changes to levels of service outlined here may be necessary from time to time, users will be informed of any significant changes in access to services by email.

13.3 Consultation Service

Specialist Registrars:	091 544573
Prof. Martin Cormican:	091 544146
Dr. Deirbhile Keady:	091 542013
Dr. Una Ni Riain:	091 893779

Dr. Teck Wee Boo:	091 893783
Dr. Dimitar Nashev	091 893783
Dr. Ruth Waldron	091 544146
Dr. Roisin Mulqueen	091 544146

13.4 Out of Hours Service

There is a Medical Scientist on duty to provide an out of hours service:

Monday-Friday	20:00 to 08:00 h the following day
Saturday	12:00 to 08:00 h the following day
Sunday/Bank Holidays	08:00 to 08:00 h the following day

Until 24:00 h the following service is available:
- All normally Sterile Body Fluids
- Blood cultures
- Corneal scrapings
- Urines
- Swabs
- Stools for viral screen
- Sputa
- Specimens from ICU / HDU/ A/E and urgent specimens from Haematology / Oncology.
- All other specimens deemed urgent by Consultant Microbiologist.

Post 24:00 h the following service is available:
- CSF
- Blood cultures
- Urgent tissues and fluids
- Paediatric urines

All specimens requiring urgent work must be sent with an Emergency 'Red Flash' form outside of normal working hours. Specimens are processed in order of priority with CSF normally being given priority.
Results of Microscopy are available as soon as the Medical Scientist has performed and authorised them on the LIS.

To contact the Medical Scientist after 17:30 please dial 4411. After 00.00 hrs the on call medical scientist is contacted via switchboard. Due to the geographic layout of the department the Medical Scientist may be outside of telephone coverage for short periods. In the event of difficulties please contact switchboard (Dial '9') who can contact the person by mobile phone.
A Consultant Microbiologist is On-Call during these periods; please contact the Medical Scientist / Switchboard for contact details.

SARS COV-2 PCR testing Out Of Hours service
Monday – Friday 17.00 – 18.30
Saturday 08.00 – 12.00
Sunday 08.00 – 12.00

13.5 Guidelines for Requesting Microbiology Tests

The Department of Medical Microbiology should also be contacted before any exceptionally urgent or specialised investigation is requested.
In all cases where a test result is considered urgent the medical practitioner making the request or other responsible medical practitioner should contact the laboratory in advance of specimen submission if possible or after a reasonable interval to ensure that the specimen has been received and that he/she receives the result.

Specimen Retention

Additional examinations may be requested during specimen storage time by telephoning the Department. Rejected specimens are also retained as per the following retention times.

Specimen	Retention Time
Swabs	1 week @ 2 – 8°C
Tissues	4 weeks @ 2 – 8°C
Fluids	
CSF	> 3 months @ -80°C
Urines	1 week @ 2 – 8°C
Faeces	1 week @ 2 – 8°C
Respiratory specimens for routine culture (these specimens cannot be processed if they are >48 hours old from date of specimen collection)	3 weeks @ 2 – 8°C
Respiratory specimens for TB culture (decontaminated prior to TB culture and therefore are unsuitable for other investigations)	> 1 month @ -20°C
Normally sterile site specimens (not usually decontaminated)	> 1 month @ -20°C
Urines unsuitable for TB culture	10 days @ 2 - 8°C
SARS COV-2 PCR Swabs	1 week @ 2-8°C

Unsuitable Specimens and Additional Examinations

In the event of a specimen being unsuitable for processing or where there is an analytical failure, the clinician will be informed by phone or in writing or electronically through the LIS. If additional laboratory testing is required by the clinician on a sample previously received, please contact the laboratory to investigate the feasibility of using the initial specimen for analysis.

General Collection and Transport Guidelines

Where possible, collect specimen prior to the administration of antimicrobial therapy.
Collect specimen with as little contamination from indigenous microbial flora as possible to ensure that the specimen will be representative of the infective site.
Collect specimen using sterile equipment and aseptic technique to prevent introduction of foreign microorganisms.
Collect an adequate amount of specimen. Inadequate amounts may yield false-negative results.
Most specimens collected with a swab and transported dry are unacceptable.
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 request form.
If members of the public are asked to collect their own or another person's sample and to take sample to the laboratory instructions should be given regarding how and when to collect the sample and deliver the samples to the laboratory in timely manner. In particular they should be reminded to put the correct collection dates on both the specimen and the request form.
Specimens should be transported as soon as possible. If processing is delayed, refrigeration is preferable to storage at ambient temperature, with the following exceptions:
Bloods Cultures - hold at room temperature to await transport by chute/porter
CSF- deliver immediately by hand to a Medical Scientist in the department
Specimens, which are difficult to replace (e.g. spinal fluid) should be given directly to one of the medical or scientific staff of the Department to minimise risk of delay or loss.
Do not submit CSF, glass blood culture bottles or glass mycolytic blood culture bottles to the laboratory via the "chute" transport system.
Microbial cultures submitted by other laboratories for further identification should be submitted in pure culture on the appropriate medium in a sealed, screw capped tube. Petri plates are generally not acceptable because they cannot be properly sealed for transport.
Specimens submitted in formalin preservative are unsuitable for culture.
Where there is a suspicion of Brucellosis or other Hazard Group 3 pathogen, it is essential that this be indicated clearly on the request form.

CSF Specimens

Table 1 Normal CSF values

Leucocytes	Neonates (less 28 days)	0 - 30 cells x 10^6/L
	Infants (1-12 months)	0 - 15 cells x 10^6/L
	Children / Adults (1 year +)	0 - 5 cells x 10^6/L

These values represent the upper and lower limits of normality. Bacterial or viral infection may still need to be considered where leucocyte counts are near the upper normal limits in neonates and young children.

Enteric Samples

All samples must be submitted to the laboratory in a clean sterile laboratory-approved specimen container with an appropriately completed laboratory request form. The optimal time of collection of specimens should be as soon as possible after onset of illness. Molecular assays for enteric pathogens in use in the department are intended for use with liquid/loose stool samples submitted from symptomatic patients. Formed stool samples are not suitable for testing and are rejected.

In-patient (excluding ED, Paeds, and Maternity but including nursing homes and district hospitals) stools are examined for *C. difficile toxin* DNA only. *C. difficile* assay testing is also performed on request from out-patient clinicians and **on all liquid stool samples received from the community.** Children < 2years are **not** processed for *Clostridium difficile.*

If specific testing for additional pathogens is required please telephone the Department of Medical Microbiology as soon as possible indicating the specific additional testing you wish to request. All other faeces specimens are examined for *Salmonella, Shigella, Campylobacter,* Verotoxin / Shiga toxin producing *E. coli, Cryptosporidium Spp.* and Giardia *DNA.* (Out-patients include A/E, SSU (St. Enda's) and MAU and Emergency Surgical Ward - St. Nicholas)
Culture of *Yersinia spp.* and *Vibrio spp*. are performed on Consultant Microbiologist request only when relevant clinical details are provided.
Screening in relation to test of clearance or contacts of outbreaks for VTEC, *Salmonella*, *Shigella* Campylobacter is done using routine culture methods rather than molecular methods.

If a patient has a sample processed for *C. difficile* toxin B gene or VTEC, Campylobacter*, Salmonella, Shigella,* Cryptosporidium or Giardia in the previous six days this sample is rejected.

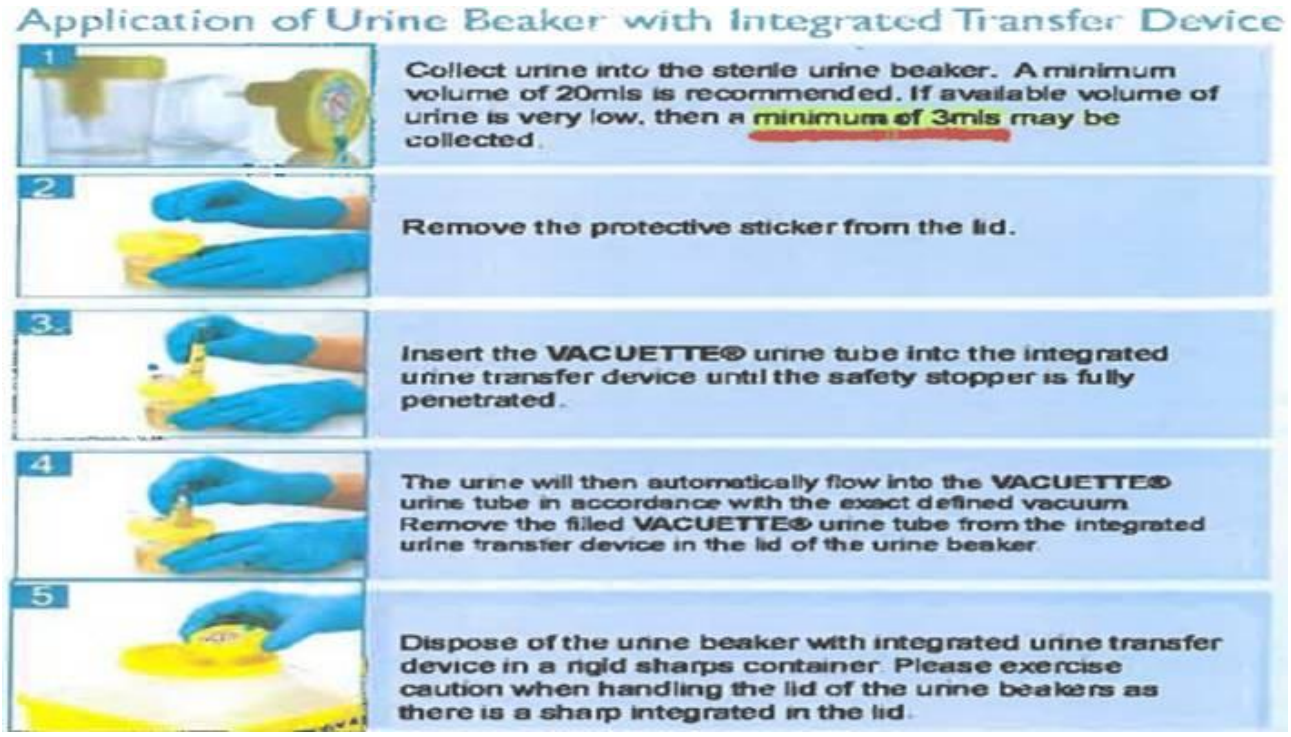
Rotavirus and *Adenovirus* are tested for in specimens from children aged less than 5 years of age.

Ova & Parasite testing; a basic iodine preparation screen is performed. Please contact Consultant Microbiologist if a full concentration is required. **This test is restricted to patients with relevant clinical details.**

H. pylori antigen testing is available for patients with dyspepsia aged less than 45 years with no "alarm symptoms". Stool samples should be submitted within 24 hours of collection for best results.
Note: "Alarm symptoms" are dyspepsia with gastrointestinal bleeding, difficulty swallowing, unintentional weight loss, abdominal swelling and persistent vomiting.

Urine Samples

Urine microscopy is performed on all Urines. Urine culture is only routinely performed on samples from children <16, maternity patients, clinical details specifying patient is neutropenic and patients with a microscopy result with a white cell count of >20cmm, however culture may be requested in certain circumstances following discussion with a Consultant Microbiologist.
Urine specimens that are received in anything but a yellow topped vacuette container as shown in the image below are unsuitable for culture and will be rejected. Urines must be decanted from the beaker into the tube before being sent to the laboratory. Beakers send to the laboratory that have not been decanted into the urine vacuette will not be processed and will be disposed of immediately.
Urine is initially collected in a primary urine beaker, then transferred via integrated transfer device to the Yellow Vacuette® urine tube, which is submitted to the laboratory.



Sputum and TB Specimens

Sputa specimens that are older than 48 hours are unsuitable for routine culture and may be rejected. The Department of Medical Microbiology does not routinely accept more than three sputum specimens for Mycobacterium culture in a single episode of illness (taken on 3 consecutive days). Please contact the laboratory if additional specimens are required in a specific case. Early morning urines are not validated to be processed by Mycobacterium culture and may only be processed in consultation with a Consultant Microbiologist.

Dermatophyte Culture – Collection and Transport

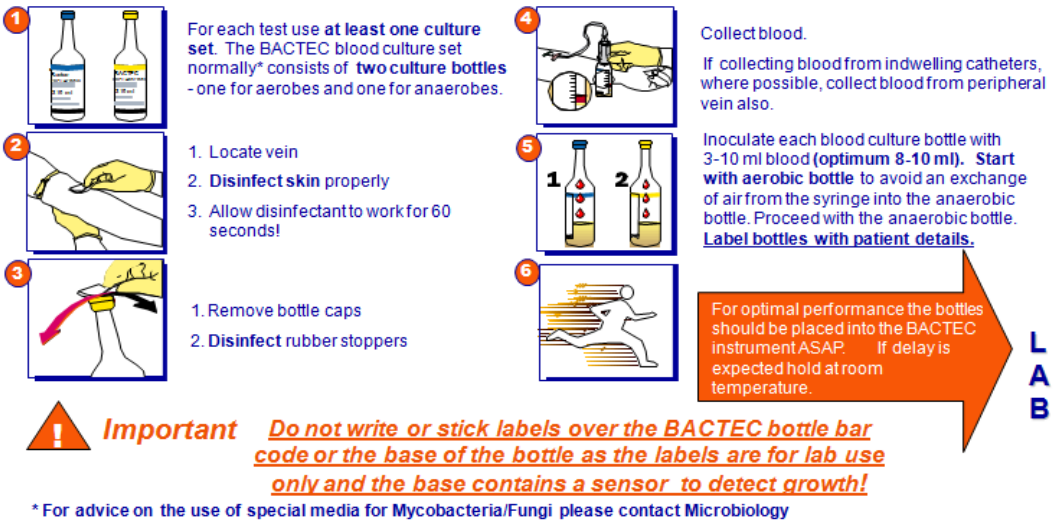
Only use Dermatological transportation packs, 'Dermapak' available from the Specimen reception at the Laboratory.
Nails: Disinfect area with 70% alcohol. Scrape. Clip infected areas. Collect debris under nail. Do not send whole nail.
Skin: Disinfect area with 70% alcohol. Scrape surface of skin at margin of lesion.
Hair: With forceps collect 10 to 12 hairs with shaft intact, as well as much loose skin and scale as possible.
Label Dermapak and insert specimen.
Specimens will only be processed if transported as above. Specimens received between glass slides, or in universals are not acceptable for Mycological investigation.

Blood Cultures – Guidelines for Collection

Only take blood cultures when there is a clinical need to do so.

BD BACTEC Blood Culture System

QUICK REFERENCE GUIDE



Blood cultures are taken to identify patients with bacteraemia. There are many signs and symptoms in a patient which may suggest bacteraemia and clinical judgement is required, however the following indicators should be taken into account when assessing a patient for signs of bacteraemia/sepsis:

- Core temperature out of range e.g. >38.5ºC or hypothermia.
- Focal signs of infection.
- Abnormal heart rate (raised); blood pressure (low or raised) or respiratory rate (raised).
- Chills/rigors.
- High or very low white cell count.
- New confusion.

NB. Signs/symptoms may be minimal in the very young or very old. Cultures should be collected as soon as possible after identification of a possible bacteraemia/focus of infection, and before antibiotic therapy is started. All blood cultures should be documented in the patient notes with date, time, collection site and indication stated.

Always make a fresh stab

Do not collect blood from existing lines/cannulae or take blood from above a peripheral IV line.
If a central line is in-situ, cultures may be collected from this and also from a separate peripheral site.
Avoid femoral vein puncture where possible in view of difficulty in cleaning/disinfecting the skin adequately at this site.

Thoroughly disinfect the skin before inserting the needle

Identify a suitable venepuncture site before skin disinfection.
Thoroughly clean the patient's skin before venepuncture.
Use soap and water to clean the visibly soiled skin and then clean your own hands.
Use 2% chlorhexidine in 70% isopropyl alcohol impregnated swab to disinfect the patient's skin and allow to dry.

Once disinfected, don't touch the skin again

To avoid contamination from the collector's fingers (even if gloved), do not palpate the site after it has been disinfected.

Disinfect the culture bottle cap before transferring the sample

Remove the plastic cover just before collection the sample – the top will be clean but not sterile. Disinfect the tops of the culture bottles with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab. Allow the alcohol to fully evaporate before inoculating the bottle.

If collecting blood for other tests, always inoculate the blood culture first.
NB. The use of blood collection adapter caps without winged blood collection sets is not recommended. It is not possible to accurately judge sample volume and there is potential for possible backflow of blood culture medium into the patient's vein.

Skin Preparation
Wash your hands with soap & water and dry.
Clean any visibly soiled skin on the patient with soap & water and dry.
Apply a disposable tourniquet (if applicable) and palpate to identify vein.
Clean skin with 2% chlorhexidine in 70% isopropyl alcohol impregnated swab and allow to dry.
If culture is being collected from a central line, disinfect the access port with a 2% chlorhexidine in 70% isopropyl impregnated swab and allow to dry.

Kit Preparation
Label bottles with appropriate patient information. Ensure the barcodes on the bottles are not covered by additional labels, and that any tear-off barcode labels are not removed.
Clean the tops of the culture bottles with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab and allow to dry.

Sample Collection
Use needle & syringe or winged blood collection method as below:
Needle & Syringe Method:
Wash & dry your hands again or use alcohol hand gel and apply clean gloves (sterile gloves are not necessary).
Insert needle into prepared site. Do not palpate again after cleaning.
Collect sample & release tourniquet.
Cover the puncture site with an appropriate dressing.
If collecting blood for other tests, always inoculate the blood culture bottles first.
Inoculate blood into culture bottles; do not change the needle in between sample collection and inoculation; inoculate the aerobic culture first.
Discard needle & syringe into a sharps container.
Wash hands after removal of gloves.
Record the procedure with indication for culture, time, site of venepuncture and any complications in the patient's record.

Winged Collection Method
Wash & dry your hands again or use alcohol hand gel and apply clean gloves (sterile gloves are not necessary).
Attach winged blood collection set to blood culture adapter cap.
Insert needle into prepared site. Do not palpate again after cleaning.
Place adapter cap over blood culture collection bottle and pierce septum.
Hold bottle upright & collect sample – use bottle graduation lines to accurately gauge sample volume; inoculate the aerobic culture first.
After collection of sample, release tourniquet.
Cover the puncture site with an appropriate dressing.
Discard winged blood collection set into a sharps container.
Wash hands after removal of gloves.
Record the procedure with indication for culture, time, site of venepuncture and any complications in the patient's record.

GUH National Reference Laboratory

National Salmonella, Shigella and Listeria Reference Laboratory
The National Salmonella, Shigella and Listeria Reference Laboratory (NSSLRL) provides a national typing service for Salmonella, Shigella and Listeria isolates to clinical laboratories as well as food and animal laboratories. The NSSLRL also has a pivotal role in investigating and tracking of Salmonella and Shigella outbreaks. A number of serological and molecular methodologies are available for outbreak analysis.
The NSSLRL Users Guide and request form can be downloaded from the website:

https://saolta.ie/documents/galway-reference-laboratory-service-incorporating-national-salmonella-shigella-listeria
https://saolta.ie/documents/nsslrl-request-form

National Carbapenemase Producing Enterobacterales Reference Laboratory (CPERL)
The CPE reference laboratory, department of Medical Microbiology, Galway University Hospitals (GUH) provides a clinically supported service for the detection of carbapenemase producing Enterobacterales.
This service is offered to all medical laboratories in hospitals throughout Ireland.
CPE Reference Lab user Guide is available at:
https://saolta.ie/documents/galway-reference-laboratory-service-incorporating-national-salmonella-shigella-listeria
https://saolta.ie/documents/cpe-request-form-issue-21

13.6 Turnaround Times

Turnaround time is defined as the time from receipt of specimen in the laboratory until the result is reported either by LIS (Laboratory Information System) or by phone. Turnaround times are quoted in the alphabetical test directory and are intended as a guide which we will endeavour to meet. If further work is required, the turnaround times may be extended by one or more days.

13.7 Notifying Infectious Diseases

The Laboratory is required to notify the Medical Officer of Health (MOH)/Director of Public Health (DPH) of certain diseases. This information is used to investigate cases thus preventing spread of infection and further cases. The information will also facilitate the early identification of outbreaks. It is also used to monitor the burden and changing levels of diseases, which can provide the evidence for public health interventions such as immunisation.

Laboratory notifications are made electronically through the Computerised Infectious Disease Reporting System (CIDR).

Notification to the Medical Officer of Health is a legal obligation and is not in contravention of data protection legislation. The Medical Officer of Health is required to treat records of infectious disease notifications in a confidential manner.

A full explanation is available on:

https://www.hpsc.ie/notifiablediseases/notifyinginfectiousdiseases/

14. Virology Department

(Division of Medical Microbiology)

14.1 Department Profile

The Virology Department, within the Division of Clinical Microbiology, is committed to providing a timely and efficient clinical diagnostic service to clinicians investigating infections of viral and of other aetiology, mainly in the HSE Western area, and aims to meet the needs of patients and all clinical personnel responsible for clinical care. It provides service to Galway University Hospitals, Mayo University Hospital, Roscommon University Hospital, Galway Clinic, Bon Secour Hospital Galway, Portiuncula University Hospital, Nursing-Home-Clinicians, General Practitioners, Community Care, and Public health in the counties of Galway, Mayo and Roscommon. The Department of Virology is accredited by the Irish National Accreditation Board (INAB) in compliance with the International Standard ISO/IEC 15189 (Registration number 223MT).

14.2 Availability of Clinical Advice and Interpretation

Clinical advice on viruses, within the Laboratory's range of interest, is available by contacting Prof. M. Cormican (Ext 4146), Dr. Una Ni Riain (Ext 3779) , Dr. Deirbhile Keady (Ext 2013) Dr. Teck Boo (Ext 3783), Dr. Dimitar Nashev (Ext 3783), Dr. Ruth Waldron (Ext4146), Dr. Roisin Mulqueen (Ext4146) or the Registrar or House Officer (Ext 4573).

14.3 Out of Hours Service

To contact Medical Staff out of hours, contact the Hospital Switchboard who will alert the Medical Staff on call after 17.30.

14.4 Add on Test Requesting

Verbal requests for any Virology tests are now accepted. There is no longer a need to send another request form with the test request on it, to the laboratory. This includes HIV and Hepatitis requests.

14.5 Virology Tests

Refer to the Test Directory of this manual for a list of tests performed, the specimen required, turnaround time, reference range, if applicable, and other information regarding specimen collection. Some tests may be performed only after prior arrangement with the laboratory. Where doubt exists, the Virology laboratory should be consulted. If deemed appropriate, results will be telephoned. To ensure early transmission of results, the clinician to whom the results are to be conveyed, must be clearly indicated on the request form and doctor's name, address (for GPs), phone number and (for in-house) bleep number should be included. For urgent investigations it is necessary to first telephone the Virology Laboratory to make arrangements for processing such requests. The emergency form must state the reason for the urgency of the test. Please note in relation to Virology tests that in addition to the requirements for completion of the request form as given in the General Information section of this book the following also applies:
Where confidentiality demands, patient's initials may be used, but it is mandatory that date of birth is supplied. Please do not use code.
The type of specimen must be indicated. If it is a swab, the swabbed site should be identified.
Clinical history and date of onset of illness, are particularly important in determining the test(s) to be performed where the investigations are extended.

Please send a separate complete sample of clotted blood when requesting Virology tests. A separate complete sample of clotted blood is essential for HIV or Hepatitis tests. Aliquots or samples previously tested for other analytes cannot be processed for HIV or Hepatitis, and generally contain insufficient volume to allow additional Virology tests to be performed.

Respiratory virus testing: SARS CoV-2, Influenza A/B and RSV- PCR Testing and Extended Viral Panel Testing

A nasopharyngeal swab should be submitted in viral transport medium which is available from Laboratory stores (labstores.uchg@hse.ie) or extension 4377.

For more details on sample collection, please contact the Microbiology Staff.
Urgent PCR requests must be brought to the attention of Microbiology Medical Staff.
Extended Viral Panel Requests must also be brought to the attention of Microbiology Medical Staff with the exception of Paediatrics, where a consultant Paediatrician request suffices.

Female Cervical Specimens

Clean the cervix with a large swab or sterile gauze, to remove mucous, before sampling. This is essential as mucous present in the sample may render it unsuitable for testing. Remove the sterile swab from the wrapper and insert into the endocervical canal until the tip is no longer visible and rotate the swab at the columnar epithelium junction for 3 – 5 seconds. Withdraw the swab without touching the vaginal surface and break it into the transport medium. Transport the specimen so that it reaches the laboratory within 24 hours of taking. Do not remove liquid from the vial.

CMV Detection

Blood for CMV PCR should be collected into 8ml Greiner K2EDTA tubes and should be hand-delivered to the Virology Department within three hours of venepuncture. Testing is only available in certain circumstances and following approval by a Consultant Microbiologist.

Molecular Virology Specimens (PCR, Viral Load, Genotype)

Blood specimens for molecular virology testing should be collected in 8ml Greiner K2EDTA tubes only and should arrive in the Virology Laboratory within 24 hours of phlebotomy and be given directly to a staff member. Deadline for receipt of molecular samples is 4.00pm. Ophthalmic specimens: carefully remove excess exudates from the surface of the eye before sampling. Using the Abbott Multicollect kit, vigorously apply the swab to the lower lid conjunctiva of the affected eye and break the swab into the transport medium. Transport the specimen so that it reaches the laboratory within 24 hours of taking.

Post Mortem Specimens

Blood for serological investigations must be collected in plain blood collection tubes and care taken not to contaminate the outside of the container. Specimens must be transported according to the specimen transport guidelines. Specimens with obvious contamination of outside surface of containers will be destroyed.

Urine Specimens

For Legionella Urinary Antigen test, freshly voided urine, in a sterile universal container, should be sent to the laboratory, without delay. Urine for ~~DEAFF test~~ CMV PCR must be received in the laboratory before 11.00 am Monday to Thursday to allow dispatch to the NVRL on the day of collection.

Viral Antibodies

Requests for “Viral Studies”, “Viral Screen”, “Routine Virology” or “Atypical Screen” will not be processed. It is necessary that tests to specific agents be requested, as viral antibody panels are no longer performed. Failure to supply the required clinical history will lead to delays in processing and / or reporting.

Viral Isolation Specimens

Please consult the Consultant Microbiologist before taking specimens for virus isolation. Viral transport swabs with viral transport medium are available from the Laboratory Stores (Ext 4377) on request.

14.6 Specimen Retention Policy

Serum and plasma specimens are currently stored frozen for two years. However due to deterioration and, in some instances, reduction of antibody, it is advised to send a fresh specimen when requiring further tests, unless it is within a few days’ time-frame of sending the original specimen.

14.7 Turnaround Times

Turnaround time (TAT) is defined as the time from receipt of a specimen in the Virology laboratory until the result is reported either in the LIS or by phone. The Department aims to result 95% of all samples within the stated turnaround times. Turnaround times may be affected in certain circumstances such as infectious disease outbreaks, where certain tests may have to be prioritized to the detriment of others.

14.8 Telephoning for Virology Results

Users may call the laboratory to check on results. Please note that as soon as results are authorised they may be available within the hospital on screen on the PAS system and for General Practitioners on Healthlinks. Whenever possible, direct access to results from the screen is preferable as recording of verbally communicated laboratory results is more liable to error than accessing results directly from the screen. Please note that this is a read from screen service – non-medical staff will not be able to interpret results or offer any advice but will refer you to medical staff if you require.

15. Out Of Hours (Emergency Service)

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

Test	Laboratory	Unrestricted	Restricted*
Alanine amino Transferase (ALT)	Clinical Biochemistry	✓	
Albumin (Blood)	Clinical Biochemistry	✓	
Alcohol (Ethanol	Clinical Biochemistry	✓	
Alkaline phosphatase (Alk Phos)	Clinical Biochemistry	✓	
Amikacin / Amikin[1]	Medical Microbiology	✓	
Ammonia	Clinical Biochemistry	✓	
Amylase	Clinical Biochemistry	✓	
APTT	Haematology	✓	
Aspartate amino Transferase (AST)	Clinical Biochemistry	✓	
Bicarbonate	Clinical Biochemistry	✓	
Bilirubin (Total and Direct)	Clinical Biochemistry	✓	
Blood Culture	Medical Microbiology	✓	
Blood Gases	Clinical Biochemistry		✓
Calcium	Clinical Biochemistry	✓	
Carbamazepine	Clinical Biochemistry		✓
Carboxyhaemoglobin	Clinical Biochemistry	✓	
Chloride	Clinical Biochemistry	✓	
Creatine Kinase (CK)	Clinical Biochemistry	✓	
Creatinine	Clinical Biochemistry	✓	
CRP	Clinical Biochemistry	✓	
CSF – Culture / Microscopy	Medical Microbiology	✓	
CSF – Glucose and Protein	Clinical Biochemistry	✓	
D-Dimers	Haematology		✓
Differential WCC	Haematology	✓	
Digoxin	Clinical Biochemistry	✓	
ESR	Haematology		✓
Fibrinogen	Haematology	✓	
Frozen Section	Histology		✓
Full Blood Count	Haematology	✓	
Gamma GT	Clinical Biochemistry	✓	
Gentamicin [5]	Clinical Biochemistry		✓
Glucose	Clinical Biochemistry	✓	
Group and Coombs	Blood & Tissue Establishment	✓	
Group and Crossmatch	Blood & Tissue Establishment	✓	
Group and Hold	Blood & Tissue Establishment	✓	
HCG Levels	Clinical Biochemistry	✓	
INR	Haematology	✓	
Iron	Clinical Biochemistry	✓	
Lactate[2]	Clinical Biochemistry	Available at POC	
LDH	Clinical Biochemistry	✓	
Lithium[3]	Clinical Biochemistry	✓	
Magnesium	Clinical Biochemistry	✓	
Malaria Screen	Haematology		✓
Methotrexate	Clinical Biochemistry		✓
Osmolality	Clinical Biochemistry		✓
Paracetamol	Clinical Biochemistry	✓	
Phenytoin	Clinical Biochemistry		✓
Phosphate	Clinical Biochemistry	✓	

Test	Laboratory	Unrestricted	Restricted*
Potassium	Clinical Biochemistry	✓	
Protein – Total	Clinical Biochemistry	✓	
Prothrombin Time (PT)	Haematology	✓	
Reticulocyte Count	Haematology		✓
Salicylate	Clinical Biochemistry	✓	
Sickle Cell Screen	Haematology		✓
Sodium	Clinical Biochemistry	✓	
Theophylline	Clinical Biochemistry		✓
Thyroid Function Tests	Clinical Biochemistry		✓
Tobramicin [1]	Medical Microbiology	✓	
Transfusion Reaction Invest	Blood & Tissue Establishment		✓
Troponin T	Clinical Biochemistry	✓	
Urea	Clinical Biochemistry	✓	
Uric acid	Clinical Biochemistry	✓	
Urinary Creatinine	Clinical Biochemistry		✓
Urinary Electrolytes	Clinical Biochemistry		✓
Urinary Urea	Clinical Biochemistry		✓
Urinary Osmolality	Clinical Biochemistry		✓
Urine Microscopy and Culture[4]	Medical Microbiology	✓ (Paeds only)	✓ (Paeds only)
Valproate	Clinical Biochemistry		✓
Vancomycin[5]	Clinical Biochemistry		✓

Requiring Consultation

1. Referred daily to Galway Clinic. Submit before 12 noon.
2. Lactate is available on all Blood Gas analysers
3. These drugs are available in “over-dose” situations only
4. Only paediatric urines are routinely processed post-midnight.
5. Available 08:00 to 20:00 only, daily

16. Alphabetical Test Directory

Acanthamoeba Molecular analysis (Amoebic Keratitis)	
Laboratory:	Medical Microbiology: - referred to Micropathology Ltd., UK
Specimen:	Corneal scraping on a dry sterile swab (available from Medical Microbiology)
Turnaround:	1 month
Report:	Presence or absence of Acanthamoeba genus DNA
ACTH	
Laboratory:	Clinical Biochemistry:
Specimen:	4.0 mL K^+ EDTA blood on ice
Turnaround:	1 week
Ref. Range:	On report form
Activated Partial Thromboplastin Time (APTT)	
Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube (1.0 mL Paediatric tubes are available). Do not refrigerate specimen. To be received in Lab within 6 hours of draw.
Comment:	See Coagulation screen. Must fill bottle to mark. Can be used to monitor Heparin therapy.
Turnaround:	1 day
Ref. Range:	Refer to report
Activated Protein C Resistance (APC-R) (see Thrombophillia Screen)	
Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube (1.0 mL Paediatric tubes are available)
Comment:	Fresh specimen required. Must fill bottle to mark.
Turnaround:	5 weeks
Ref. Range:	Refer to report
Adalimumab (trough levels and antibodies)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Report:	Drug levels (mg/L): Suboptimal (<3ug/ml), therapeutic (3-7ug/ml) and supratherapeutic drug (>7ug/ml) levels Antibodies: Negative = <10ngAU/ml
Adenovirus / Rotavirus Antigen	
Laboratory:	Medical Microbiology
Specimen:	Faeces collected in acute phase of illness 1-2 g in leak proof container. Delay > 2 h refrigerate @ 2-8^{O}C Comment: *Rotavirus* and *Adenovirus* are tested for in specimens from children aged less than 5 years of age.
Turnaround:	1 working day
Report:	Rota / Adenovirus antigen detected / not detected
Adjusted Calcium	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Calculated parameter
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Adrenaline PAEDIATRICS query neuroblastoma - urine	
Laboratory:	Clinical Biochemistry, referred to external laboratory for analysis
Specimen:	Paediatrics <12 years, only for query neuroblastoma, 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	12 working days
Interpretation:	As per returned report

Adrenaline - plasma	
Laboratory:	Clinical Biochemistry, referred to external laboratory for analysis
Specimen:	Lithium Heparin Plasma, must be brought to the lab immediately for processing (within 1 hour)
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	10 working days
Interpretation:	As per returned report
Alanine amino Transferase (ALT)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Albumin	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Albumin (Urine) / Microalbumin	
Laboratory:	Biochemistry Laboratory, Roscommon University Hospital
Specimen:	Urine in plain vacutainer – part of new BD urine collection system
Comment:	Date of collection must be stated on the request form.
Turnaround:	See RCH TAT
Ref. Range:	Refer to report
Alcohol (Ethanol)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube filled completely & delivered immediately to the laboratory. If delay in transport to laboratory is expected, 4.0mL blood collected into a fluoride oxalate (grey top) tube filled completely is the preferred sample.
Comment:	Do not use alcohol wipes. Analysis for medical use only
Turnaround:	Urgent: 1hour. All other requests: 3hours
Interpretation:	On report form
Aldosterone	
Laboratory:	Clinical Biochemistry
Specimen:	2 x 5 mL: k^+EDTA (Plasma) & Delivered to laboratory immediately.
Comment:	Please provide clinical/antihypertensive medication details.
Turnaround:	3 weeks
Ref. Range:	On report form
Aldosterone/Plasma Renin Activity Ratio	
Laboratory:	Clinical Biochemistry
Specimen:	2 x 5 mL: k^+EDTA (Plasma) & Delivered to laboratory immediately
Comment:	Please provide clinical/antihypertensive medication details
Turnaround:	3 weeks
Ref. Range:	On report form
ALK Translocation (EML4-ALK translocation)	
Laboratory:	Department of Histopathology, Cytopathology and Molecular pathology
Specimen:	Tissue samples already processed by the Histopathology Laboratory, arrange via consultant pathologist.
Comment;	Testing available on request by Pathologist.
Referrals:	Contact the Department of Histopathology, Cytopathology and Molecular pathology on 4078
Turnaround;	5 – 10 working days after request from Pathologist received.
Report:	Integral part of Histopathology report issued by Division of Anatomic Pathology, Department of Histopathology, Cytopathology and Molecular Pathology.

Alkaline phosphatase (Alk Phos)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Allergen Specific IgE (Rast)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in a plain gel tube. Must specify allergen according to history.
Comment:	Those not performed in GUH are referred to Immunology Dept, Northern General Hospital, Sheffield. Note restrictions in place for referral requests.
Turnaround:	5 working days
Ref. Range:	0 - 0.35 kUA/L
Alpha-1-Antitrypsin	
Laboratory:	Immunology
Specimen:	5.0 mL blood in a plain gel tube
Turnaround:	5 working days
Ref. Range:	0.9 - 2.0 g/L
Alpha-1-Antitrypsin Phenotyping	
Laboratory:	Immunology: referred to Alpha One Foundation, Beaumont Hospital, Dublin.
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	See report- including interpretative comment
Alpha fetoprotein (AFP)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
Alpha-1-iduronidase (Screen for Hurlers Syndrome)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	5.0 mL K^+ EDTA whole blood and 5.0 mL fresh urine
Comment:	Specimens must be sent to the laboratory Mon – Tue am only.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form including interpretative comment
17-Alpha-OH-Progesterone >1 year old	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0 mL blood in a plain gel tube delivered to the laboratory same day
Turnaround:	6 weeks
Ref. Range:	On report form
17-Alpha-OH-Progesterone <1 year old	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Clotted whole blood collected when baby is at least 2 days old
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Aluminium	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis,
Specimen:	5.0 mL Na^+ heparin whole blood
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Amikacin	
Laboratory:	Medical Microbiology: Referred to external laboratory.
Specimen:	1.0 – 5.0 mL blood in a plain gel tube
Comment:	Specify time specimen collected indicating Peak or Trough.
Turnaround:	1 day. Cut off time (12.00) for same day referral.
Ref. Range:	Post dose/Peak: 20-30 mg/L. Pre-dose/Trough: <8.0 mg/L
Amino Acids	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis,
Specimen:	2.0 mL Li Heparin blood, received in the laboratory within 1 hour of venepuncture
Comment:	Fully completed CHI at Temple Street Metabolic Request form (GUH Useful Resources) with clinical information and reason for request must accompany specimen.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Amino Acids (Urine)	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis,
Specimen:	1.0 mL plain urine specimen
Comment:	Full clinical information and reason for request must accompany specimen
Turnaround:	1 – 3 weeks
Report:	On report form
Ammonia	
Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL EDTA stasis free whole blood
Comment:	Please inform laboratory in advance. Place specimen on ice and transport to the laboratory within 30 minutes of venepuncture
Turnaround:	Once laboratory informed in advance results will be available in 1 hour
Ref. Range:	On report form
Amoebic antibodies (Entamoeba histolytica; E. dispar; Amoebic liver abscess)	
Laboratory:	Virology: -referred to Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	State clinical details and onset date. Serology may take up to 2 weeks to become positive in amoebic liver abscess. Note that faecal sample should be tested for *E. histolytica* in suspected intestinal amoebiasis/amoebic dysentery. Available in only very specific cases and following prior arrangement with a Consultant Microbiologist.
Turnaround:	2 – 3 weeks
Report:	Detected/Not Detected with comment if detected.
Amphetamine	
See "Urine Drugs of Abuse Screen"	
Amylase	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent 1hour. Priority: 3hours. Routine: same day
Ref. Range:	On report form
Amylase/Creatinine Clearance Ratio (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube plus a random urine specimen
Turnaround:	1 working day
Interpretation:	On report form
Androstenedione	
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	5.0 mL blood in a plain gel tube
Turnaround:	3 week
Ref. Range:	On report form

Antenatal Serology	
Laboratory:	Blood & Tissue Establishment
Specimen:	6.0 mL EDTA K^2E blood
Turnaround:	Within 24 h, with the exception of weekends and bank holidays and in the event of additional testing requirement or for an antibody which requires extensive investigation
Ref. Range:	N/A
Antibody Titration	
Laboratory:	Blood & Tissue Establishment
Specimen:	6.0 mL EDTA K^2E blood
Turnaround:	Within 1 day, with the exception of weekends and bank holidays and in the event of additional testing or if an antibody that requires extensive investigation
Ref. Range:	N/A
Anti IgA Antibodies	
Laboratory:	Immunology: – referred to NHS Blood & Transplant, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Acetylcholine Receptor Antibodies	
Laboratory:	Immunology: – referred to Immunology Laboratory, Churchill Hospital, Oxford OX3 7LJ.
Specimen:	5.0 mL blood in a plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Adrenal Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in a plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Beta-2 Glycoprotein-1 Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	Refer to report
Anti-Beta-Interferon Neutralising Antibodies	
Laboratory:	Immunology- referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Basal Ganglia Antibodies	
Laboratory:	Immunology:-referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Cardiac Muscle Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti Cardiolipin Antibodies (IgG, IgM cardiolipin & Beta 2 glycoprotein)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	On report form including interpretative comment

Anti-CASPR2 antibodies	
Laboratory:	Immunology: – referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Comment:	Refer to anti-VGKC
Turnaround:	6 weeks
Report:	Refer to report

Anti CCP (Citrullinated Cyclic Peptide)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	Requests for Anti-CCP will also be tested for Rheumatoid Factor
Turnaround:	4 working days
Report:	Negative <10 U/mL
Anti-Centromere Antibodies	
Laboratory:	Immunology
Comment:	Refer to Connective Tissue Disease screen
Anti-C1q Antibody	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-CV2/ CRMP5	
Laboratory:	Immunology: – referred to UCL, London
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Turnaround:	6 weeks
Anti-D Quantitation	
Laboratory:	Blood & Tissue Establishment: - referred to IBTS, St James's Street, Dublin 8
Specimen:	6.0 mL EDTA K^2E blood
Turnaround:	Test performed Tuesdays and Thursdays only
Ref. Range:	N/A
Anti-dsDNA Antibody	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	Only performed in the context of positive ANA
Turnaround:	7 working days
Ref. Range:	Refer to report
Anti-ENA Screen (Extractable Nuclear Antigens: Sm / RNP / Ro / La / Scl-70 / Jo-1)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Refer to report.
Anti-Endomysial Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	IgA anti-endomysial antibody test if IgA anti-tTG screening test positive.
Turnaround:	7 working days
Report:	Positive/Negative
Anti-GABA a (anti-glutamate receptor antibodies)	
Laboratory:	Immunology: – referred to Immunology Dept, Churchill Hospital, Oxford OX3 7LJ.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Turnaround:	6 weeks
Report:	Refer to report

Anti-GABA b (anti-glutamate receptor antibodies)	
Laboratory:	Immunology: – referred to UCL, London
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Turnaround:	6 weeks
Report:	Refer to report
Anti-Ganglioside Antibodies	
Laboratory:	Immunology: – referred to Neuroimmunology Lab, Queen Elizabeth University Hospital, Glasgow
Specimen:	5.0 mL blood in plain gel tube
Comment:	As several types of anti-ganglioside antibodies occur please specify test required and provide clinical details.
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Gastric Parietal Cell Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Report:	Positive/Negative
Anti-GBM Glomerular Basement Membrane (GBM) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	3 working days
Report:	0 – 10 U/mL
Anti-Glutamic Acid Decarboxylase (GAD) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in a plain gel tube
Turnaround:	7 working days
Ref Range:	0-9 IU/mL
Anti-Glycine Receptor Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Churchill Hospital, Oxford OX3 7LJ.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Turnaround:	6 weeks
Report:	Refer to report
Anti-Histone Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-IA2 Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive: >10 IU/ml; Negative 0-10 IU/ml
Anti-Insulin Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Ref. Range:	0-5 mg/l
Anti-Intrinsic Factor Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 Working days
Report:	0 – 7 EliA U/ml

Anti-Islet Cell Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive / Negative
Anti-Jo–1 Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-La (SS-B) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-LGi1 antibodies	
Laboratory:	Immunology: – referred to UCL, London
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Comment:	Refer to anti-VGKC
Turnaround:	6 weeks
Report:	Refer to report
Anti-Liver Kidney Microsomal (LKM) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-Mitochondrial Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-M2 Mitochondrial (Pyruvate Dehydrogenase) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-Mullerian Hormone (AMH)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
Anti-MUSK Antibodies	
Laboratory:	Immunology: – referred to Immunology Laboratory, Churchill Hospital, Oxford OX3 7LJ.
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 Weeks
Report:	Positive/Negative
Anti-Myelin Associated Glycoprotein (MAG) Antibodies	
Laboratory:	Immunology: – referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Myeloperoxidase (MPO) Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	0 - 3.5 IU/ml

Anti-Natalizumab (Tysabri) Antibodies

Laboratory:	Immunology: – referred to Bart's Hospital, London
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	4 weeks
Report:	Positive/Negative

Anti-Neuromyelitis Optica (NMO) Antibodies

Laboratory:	Immunology: – referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis is also available
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Neuronal Nuclear Cell (Hu Ri) Antibodies

Laboratory:	Immunology: – referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube
Comment:	Supply clinical details and specify if other neuronal antibody tests required.
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Neutrophil Cytoplasmic Antibodies (ANCA)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Report:	Screened at 1/20 Negative / C-ANCA / P-ANCA / Atypical ANCA Positives tested for anti-MPO and anti-PR3. See report form for interpretative comment.

Anti-Nuclear Antibody (ANA)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Screened at 1/80 Negative/Positive. Positive results titre 1/80 to ≥1/1280. ANA Pattern reported.

Anti NMDA Receptor Antibodies

Laboratory:	Immunology: - referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also ava
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Ovarian Antibodies

Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Paraneoplastic Antibodies: See anti-Hu Ri Yo

Laboratory:	Immunology: – referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Comment:	Supply clinical details and specify if other paraneoplastic antibody tests (CV2/CRMP5, Ma1/Ma2, anti-amphiphysin, anti-titan abs) required.
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Parietal Cell Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 Working days
Report:	0 – 10 EliA U/ml

Anti-Pemphigus & Pemphigoid Autoantibodies

Laboratory:	Immunology: - referred to Immunology Dept, St James Hospital, Dublin 12
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Phospholipase 2A receptor (PLA2R) antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	15 working days
Ref. Range:	0-14 RU/mL

Anti-Platelet antibody investigation

Laboratory:	Blood & Tissue Establishment: - referred to IBTS, St James's Street, Dublin 8
Specimen:	6.0 mL EDTA K^2E blood
Turnaround:	Variable
Ref. Range:	N/A

Anti-Proteinase 3 (PR3) Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	0 -2 IU/ml

Anti-Purkinje Cell (Yo) Antibodies

Laboratory:	Immunology: referred to UCL, London.
Specimen:	5.0 mL blood in plain gel tube. CSF analysis also available.
Comment:	Supply clinical details and specify if other neuronal antibody tests required.
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Ribosomal P Protein Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative

Anti-Ro (SS-A) Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative

Anti-Salivary Gland Antibodies

Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Scl-70 (Topoisomerase 1) Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative

Anti-Skeletal (Striated) Muscle Antibodies	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative
Anti-Sm (Smith) Antibody	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-Smooth Muscle Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Ref. Range:	Positive/Negative
Anti-Soluble Liver Antigen (SLA) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative
Anti-Streptolysin-O (ASO) Titre	
Laboratory:	Virology
Specimen:	7.0 mL blood in plain gel tube
Comment:	Test indications: Suspected post-streptococcal condition e.g. glomerulonephritis, rheumatic fever, PANDAS suspected. Available in specific cases only and by prior arrangement with a Consultant Microbiologist.
Turnaround:	1 week
Report:	Reported in International Units. Normal Range <200 IU.
Antithrombin (see Thrombophilia Screen)	
Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube.
Comment:	Requests should be received by the laboratory within eight hours of phlebotomy. Details of anticoagulant therapy required. Must fill bottle to mark.
Turnaround:	5 weeks
Ref. Range:	Refer to report
Anti-Thyroid Peroxidase (TPO) Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	4 working days
Ref. Range:	0 – 25 IU/ml
Anti-Thyroid Receptor Antibodies	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 working days
Ref. Range:	Negative: <2.9 IU/l Equivocal: 2.9-3.3 IU/l Positive: >3.3 IU/l
Anti-Tissue TransGlutaminase (tTG) Antibodies (Coeliac Screen)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	IgA anti-tTG antibody test. If selective IgA deficiency, then IgG anti-tTG test performed. Refer to Section 11.3 for information regarding gluten intake prior and during testing.
Turnaround:	7 working days

Ref. Range:	IgA anti tTG: 0-10 IU/ml. IgG anti-tTG: 0-7 IU/ml

Anti-U1-RNP Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative

Anti-Voltage Gated Calcium Channel (VGCC) Antibodies

Laboratory:	Immunology: – referred to Eurofins Biomnis.
Specimen:	5.0 mL blood in plain gel tube- MUST be frozen with 4 hours of collection.
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Voltage Gated Potassium Channel (VGKC) Antibodies

Laboratory:	Immunology: – referred to UCL, London.
Specimen:	4.0 mL blood in a plain gel tube.
Turnaround:	6 weeks
Report:	Positive/Negative

Anti-Xa Level (Low M.W. Heparin Assay)

Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube (2 samples required).
Comment:	Requests should be received in the laboratory within 2 hours of phlebotomy and should be taken 4-6 hours post dose. Please included type of LMWH. State time of the last heparin dose on the request form and sampling time. Must fill bottle to mark.
Turnaround:	1 week

Anti-ZNT8 Antibodies

Laboratory:	Immunology: – referred to Immunology Dept, Northern General hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive: >15U/ml; Negative <15U/ml

Apolipoprotein A1

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	1 week
Report:	On report form

Apolipoprotein B

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	1 week
Report:	On report form

Arsenic (Urine)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	200mL aliquot urine (note volume of 24 h collection)
Turnaround:	3 – 4 weeks
Ref. Range:	On report form

Ascitic Fluid - Cytology

See “Effusions”

Ascitic Fluid (see Fluid / Tissue / Pus)

Laboratory:	Medical Microbiology
Specimen:	Fluid including clots in sterile universal container
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	Microscopy: 1 working day Culture: 3 working days
Report:	Microscopy: Cell count, Differential and Gram stain Culture: Any clinically significant isolate with the appropriate sensitivities

Aspartate amino Transferase (AST)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form

Aspergillus fumigatus precipitins	
Laboratory:	Virology: -referred to: PHL, Cumberland Infirmary, Carlisle CAZ 7HY
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Test indications: suspected aspergillosis in immunocompetent patients (e.g. allergic bronchopulmonary aspergillosis (ABPA), aspergilloma, chronic necrotising aspergillosis, aspergillus sinusitis). Available only in specific circumstances and with prior approval of a Consultant Microbiologist.
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected with comment if result positive.

Aspirates - Cytology	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Cells obtained from any palpable lump/mass or cyst
Comment:	Prepare immediately on site: Clearly label 2 frosted coded slides with patient name, DOB or BN. Air dry one smear, label this slide' Air Dried', and fix the second one with cytofix spray. Wash any fluid remaining in syringe/needle into green cyto fixtative in a Universal container. In the case of pathology assisted F.N.A's this collection of specimens is performed by lab staff. For pathologist assisted FNA, please telephone the laboratory to prebook. Ref FNA.
Turnaround:	80% by 5 working days
Report:	Neoplastic / Non-neoplastic cells

Autoantibody Tests	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	Select specific autoantibody test(s) pending clinical picture In addition to those listed under the 'Guidelines for requesting Immunology tests' section of handbook, other autoantibody tests may be available. Please discuss with laboratory.
Turnaround:	7 working days, depending on individual autoantibody and whether additional specialized test methods required.

AutoImmune ENA Panel – Profile includes anti-: nRNP, Sm, SS-A, Ro-52, SS-B, Scl-70, PM-Scl, Jo-1, Centromere, PCNA, dsDNA, Nucleosomes, Histones, Ribosome-P protein and AMA-M2	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive / Negative

AutoImmune Inflammatory Myopathy panel includes anti-: Mi-2 alpha, Mi-2 beta, TIF1 gamma, MDA5, NXP2, SAE1, Ku, PM-Scl100 and PM-Scl75, OJ, EJ, Jo-1, PL-7, PL-12, SRP, Ro-52, HMGCR and CN1a.	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive / Negative

Autoimmune Liver Disease Panel – Profile includes anti: AMA-M2 (pyruvate dehydrogenase complex), M2-3E (BPO, fusion protein of the E2 subunits of the alpha-2-oxoacid dehydrogenases of the inner mitochondrial membrane), Sp100, PML, gp210, LKM-1, LC1, SLA/LP and Ro52.	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive / Negative

Autoimmune Systemic Sclerosis Panel – Profile includes anti-Scl-70, Centromere A, Centromere B, RNA Pol III(RP11 and 155), Fibrillarin, NOR 90, Th/To, PM-Scl 100, PM-Scl75, Ku, PDGFR and Ro-52	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive / Negative
Avian precipitins (Bird Fancier's Lung (BFL) disease)	
Laboratory:	Virology: referred to PHL, Cumberland Infirmary, Carlisle CAZ 7HY
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Available only in specific circumstances (investigation of ? BFL with risk factors) and with prior approval of a Consultant Microbiologist.
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~Detected/Not detected
Bacterial PCR (For sterile fluids and Tissues) S.aureus PCR (Mec A and CoA), Group A Streptococcus DNA, N. meningitidis DNA, Haemophilus influenzae DNA and Streptococcus pneumoniae DNA.	
Laboratory:	Medical Microbiology - referred to Great Ormond Street Hospital
Specimen:	Sterile tissue or 0.5ml of fluid in leak-proof sterile container
Comment:	Available only by prior arrangement with Microbiology Medical Staff
Turnaround:	2 weeks (Verbal report available on detected targets)
Report:	Targets Detected/Not Detected.
Bartholin's Abscess (see Swab / Pus)	
Laboratory:	Medical Microbiology
Specimen:	Aspirate or swab pus using a sterile swab in charcoal agar. If delay refrigerate @ 2-8^{O}C
Comment:	Endocervical / Urethral swabs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required.
Turnaround:	3 working days
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities
Bartonella henselae PCR (Cat Scratch Disease)	
Laboratory:	Virology: -referred to Health Protection Agency, Respiratory & Systemic Infection Lab, Colindale London NW9 5HT
Specimen:	Tissue samples for 16SrRNA gene sequencing only.
Comment:	By prior arrangement with Microbiology Medical Staff.
Turnaround:	2-3 weeks
Report:	Detected/Not detected.
Bartonella Serology	
Laboratory:	Virology: -referred to Rare & Imported Pathogens Laboratory (RIPL) Porton Down, Salisbury.
Specimen:	Serum
Comment:	Not routinely available; research only and only on discussion with Microbiology Medical Staff.
Turnaround:	2-3 weeks
Report:	Detected/Not detected
BCR-ABL	
Laboratory:	Haematology: - referred to CMD Laboratory, St James Hospital, Dublin 8
Specimen:	3 x 3.0 mL K^{3} EDTA blood, or Bone Marrow in RPMI
Comment:	Test available Monday –Thursday only. CMD request form required. Prior approval by consultant Haematologist or registrar.
Turnaround:	120 days
Ref. Range:	N/A

Bence - Jones proteins (Urine Free Light Chains)	
Laboratory:	Immunology
Specimen:	Early morning sample preferred for screening– minimum 15mls. 24h urine for quantification and disease monitoring. Plain container no preservatives. Note: Yellow Vacuette® urine tubes are unsuitable. Refer to section 8.11 for 24hr sample collection details.
Turnaround:	15 working days
Report:	Positive/Negative: Typing by Immunofixation. Quantification of BJP 24h output or BJP concentration - g/l
Beta-hydroxybutyrate	
See "Ketones"	
Beta-2-Microglobulin	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	< 60 years: 0.8 – 2.4 mg/l, >60 years: 0 – 3.0 mg/L
Beta-2-Transferrin	
Laboratory:	Immunology: referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	Ear/nasal discharge in universal container
Turnaround:	3 weeks
Report:	Positive/Negative
Bicarbonate	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Bile Acids	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	1 working day Mon to Fri
Ref. Range:	On report form
Bile Fluid for culture	
Laboratory:	Medical Microbiology
Specimen:	Sample in Plain universal
Turnaround:	3 working days
Report:	Any Growth.
Bilirubin - Conjugated	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Bilirubin - Total	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Biopsy	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin
Comment:	Health & Safety precautions
Report:	Histological diagnosis

BK (Polyomavirus) PCR	
Laboratory:	Virology: - referred to NVRL
Specimen:	EDTA whole blood; Urine
Comment:	Post-transplant surveillance of renal transplant and haemopoietic stem cell recipients.
Turnaround:	2 – 3 weeks
Report:	Detected/not detected. Quantitative viral load available.
Biotinidase	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	5.0 mL Li Heparin blood
Comment:	Full clinical information and reason for request must accompany specimen
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Blood Culture	
Laboratory:	Medical Microbiology
Specimen:	8.0 -10.0 mL in Bactec Aerobic and Anaerobic vial, 1.0 -3.0 mL in Paediatric vial. For Mycobacteria / Fungi use 1.0 -5.0 mL in Myco/Lytic vial
Comment:	Deliver to Laboratory ASAP. Use the Chute to 411. Bactec vials MUST reach Microbiology within 4 hours of Collection.
Turnaround:	1 week for aerobic, anaerobic and paediatric vials, 21 days for query endocarditis and 6 to 7 weeks for MycoLytic via. Gram stain results of all new positive blood cultures are telephoned to the relevant medical team within 2 hours of positivity. Identification and susceptibility testing results will be available in 24-48 hours. Further time may be needed for results to be returned by Reference laboratories in certain cases.
Report:	Any Growth.
Blood Film	
Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood, (1.0 mL Paediatric tubes are available)
Comment:	Blood films will be made, examined and reported on patients FBC results which satisfy the Criteria laid down by this laboratory in the guidelines 'Indications for blood film examination'. If a clinician specifically requests a blood film which falls outside of these guidelines this will also be examined where the request form provides clinical details.
Turnaround:	Where clinical details are supplied urgent requests for blood films will receive immediate attention. Routine differentials are reported within 1 day. For GP specimens, 2 working days.
Report:	N/A
Blood Gases (pH, pCO_2, pO_2, Bicarbonate, Base Excess, Total CO_2)	
Laboratory:	Clinical Biochemistry. Also available on Blood Gas analysers located in A/E, ICUs, NICU, AMAU, labour ward, theatre and SCU.
Specimen:	Blood in a Li Heparin syringe
Comment:	If delay between sample collection and arriving in the laboratory is greater than 15 minutes send on ice.
Turnaround:	15 minutes
Ref. Range:	On report form
Blood Product for Culture	
Laboratory:	Medical Microbiology
Specimen:	Bactec Blood culture vials. If delay leave on ward until collection by Porter.
Comment:	Ensure labelling as per Haemovigilance procedure. Delivery by Porter if glass bottles. Store on ward @ RT. Do not refrigerate. Plastic bottles may be sent by 'Chute'.
Turnaround:	1 week.
Report:	Any Growth.

Body Cavity Fluid Cytology (Pleural, Peritoneal, Pericardial, Abdominal and Ascite Fluid).	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Collect fresh 10 – 20 mL specimens into twist top leak proof 20 mL or 50 mL Universal containers containing Shandon Cytospin Collection Fluid (green fixative solution). Refrigerate overnight if necessary.
Comment:	Indicate type of primary specimen and site and side of origin (e.g. left lobe BAL). Indicate clinical history on test requisition and reason for test.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells

Bone Marrow Culture	
Laboratory:	Medical Microbiology
Specimen:	1.0 -3.0 mL in Paediatric vial. For Mycobacteria / Fungi use 1.0 -5.0 mL in Bactec Myco/Lytic vial.
Comment:	Do not refrigerate. Plastic bottles may be sent by 'Chute'.
Turnaround:	1 week for paediatric vial and 6 to 7 weeks for Myco/Lytic vial.
Report:	Any Growth.

Bone Marrow Examination	
Laboratory:	Haematology
Specimen:	Bone Marrow Aspirate spread on glass slides. Aspirate and Biopsy fixed in Bouin's solution
Comment:	All bone marrows are preauthorized by SPR Haematology and prearranged with both the laboratory and point of clinical activity. All BMA requests should be accompanied by an EDTA (FBC) specimen. All requests must be accompanied by fully completed relevant request forms for bone marrows, immunophenotyping or cytogenetics.
Turnaround:	2 weeks.
Report:	Qualitative report by Consultant Haematologist.

***Bordetella pertussis* antibodies**	
Laboratory:	Virology – referred to Atypical Pneumonia Unit, Colindale Avenue, London NW9 5HT
Specimen:	7.0 mL blood in a plain gel tube
Comment:	May be used to provide evidence of vaccination or past infection; test does not determine immunity to *B. pertussis*. Send at least 14 days after onset of persistent cough. Available only in very specific cases and following prior arrangement with a Consultant Microbiologist.
Turnaround:	1 – 3 weeks
Report:	Detected/Not detected

***Bordetella* Species (Whooping cough / Pertussis) – culture**
See Whooping Cough

***Borrelia burgdorferi* antibodies (Lyme Disease)**	
Laboratory:	Virology. Specimens which are reactive at GUH are referred to the PHE, Rare and Imported Pathogens Laboratory (RIPL), Porton Down for further testing and a final report.
Specimen:	7.0 mL blood in a plain gel tube. (For CSF-PCR see under Cerebrospinal Fluid)
Comment:	**Clinical details essential.** Samples **without clinical details** will **NOT be tested** but stored pending same**.** Patients with **classical rash of erythema migrans are treated** on clinical grounds **without serological testing.** If testing indicated, take samples 4-6 weeks after symptom onset and please state: If the patient had a **tick bite and the date** of the tick bite; **Date of onset** of symptoms and **details of symptoms**; If **neurological and/ or ophthalmic** symptoms.
Turnaround:	1 - 2 weeks (In-house screen). Samples referred for further testing 2-3 weeks.
Report:	Not Detected, if negative. A provisional report will be issued on any sample giving reactive findings on initial testing and referred to the RIPL for further testing and a final report.

BRAF mutation	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology Laboratory, arrange via consultant pathologist.
Comment;	Testing available on request by Pathologist.
Referrals	Contact Department of Histopathology, Cytopathology and Molecular pathology on 4078
Turnaround;	5 – 10 working days after request from Pathologist received
Report:	Integral part of Histopathology report issued by Division of Anatomic Pathology, Department of Histopathology, Cytopathology and Molecular Pathology.
Bronchial Brush Specimen	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Sample can be spread on a glass slide, one slide may be air dried and labelled for Diff quik stain, and one slide spray fixed. Label slides and container to include name, date of birth and sample site.
Comment:	Indicate clinical history on test requisition, and the specific site sampled.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells. Detection of infectious organisms.
Bronchial Wash Specimen	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Collect fresh specimens (0.5 – 50.0 mL) into twist top, leak proof 50 – 100 mL specimen cups. Do not add fixative but refrigerate if storage required. Transport to the laboratory, ASAP. Refrigerate or add fixative if delay unavoidable.
Comment:	Indicate clinical history on test requisition, and the reason for test.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells. Detection of infectious organisms.

Broncho Alveolar lavage fluid (BAL)/ Bronchial Washings - Culture	
Laboratory:	Medical Microbiology
Specimen:	BAL in sterile container
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days for routine culture, 6 to 7 weeks for Mycobacteria culture. All BALs are tested for TB using GeneXpert MTB/Rif ultra. Mycobacterial microscopy/culture is not performed unless clinical details state MOTT or NTM or are positive on gene Xpert.
Report:	Culture with sensitivities, if appropriate, as well as microscopy and culture for Mycobacteria
Broncho Alveolar lavage fluid - Cytology	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Collect fresh 0.5 – 50 mL BAL (indicate if RUL, RLL, LUL, LLL) in a twist top, leak proof 50 – 100 mL specimen container. Submit to laboratory ASAP. Refrigerate or add fixative if delay unavoidable.
Comment:	Indicate clinical history on test requisition form and reason for test.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells. Detection of infectious organisms.
Brucella antibodies	
Laboratory:	Virology: referred to Liverpool Clinical Laboratories, Royal Liverpool and Broadgreen University Hospitals Trust
Specimen:	7.0 mL blood in a plain gel tube
Comment:	State clinical symptoms**, travel and exposure history.** Antibody response may take up to 6 weeks to develop. Available only in very specific circumstances and with prior approval of a Consultant Microbiologist.
Turnaround:	2-3 weeks
Report:	~~Negative/Positive.~~ Detected/Not detected

Bursa Fluid	
Laboratory:	Medical Microbiology
Specimen:	Fluid in sterile container.
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Culture with sensitivities, if appropriate
CA 125	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form
CA 15-3	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
CA 19-9	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
Cadmium (Urine)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Caffeine	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Plain clotted sample
Comment:	Method not suitable for analysis in adults
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Calcitonin	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	5.0 mL blood in a plain gel tube sent to lab immediately on ice
Comment:	Send fasting specimen. Must be separated and frozen within 15 minutes of phlebotomy.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Calcium	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Calcium -ionised	
Laboratory:	Clinical Biochemistry: -also available on Blood Gas analysers located in A/E, ICUs, HDU, NICU, AMAU, labour ward, theatre and SCU
Specimen:	Blood in a balanced heparin syringe
Comment:	Send specimen to laboratory within 15 minutes of collection
Turnaround:	15 minutes
Ref. Range:	On report form

Calcium (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24 hour acidified urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

CAL-R
See MPN Panel

Cannabis
See "Urine Drugs of Abuse Screen"

Carbamazepine (Tegretol)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen immediately before next dose (trough specimen)
Turnaround:	1 week
Therapeutic range:	On report form

Carbapenemase Producing Enterobacteriaceae Screen	
Laboratory:	Medical Microbiology
Specimen:	Rectal swab in transport medium / faeces sample. Delay > 2 h refrigerate @ 2-8°C.
Comment:	Restricted to specific groups of hospitalized patients. Non-hospitalized patients are screened by prior arrangement with a Consultant Microbiologist.
Turnaround:	3 working days. (A longer turnaround time is needed if sample is referred to the CPE Reference Laboratory).
Report:	CPE isolated/Not isolated.

Carboxyhaemoglobin	
Laboratory:	Clinical Biochemistry
Specimen:	Blood in a Heparinised syringe
Turnaround:	15 minutes
Ref. Range:	On report form

Cardiac biopsy	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions.
Report:	Histological diagnosis

Carnitine, Acetyl	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	2 blood spots on Newborn Screening card, air dry for 2 hours
Comment:	Full clinical information and reason for request must accompany specimen
Turnaround:	1 – 3 weeks
Ref. Range:	On report form including interpretative comment.

Carnitine, Free & Total	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	5.0 mL Li Heparin blood
Comment:	Full clinical information and reason for request must accompany specimen
Turnaround:	1 – 3 weeks
Ref. Range:	On report form including interpretative comment

Carotene
See "Vitamin A"

Catecholamines
See "Metanephrines", "Adrenaline", "Noradrenaline"

Catecholamines and Metanephrines PAEDIATRIC PATIENTS < 12 YRS query neuroblastoma - Urine (Adrenaline/Noradrenaline/Dopamine/Homovanillic acid (HMMA)/Vanillylmandelic acid (VMA))	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Paediatrics <12 years, only sent for query neuroblastoma, 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	12 working days
Interpretation:	As per returned report
Catheter / Intravascular Cannulae / Tips	
Laboratory:	Medical Microbiology
Specimen:	Lines and Tips from arterial /venous lines cut to 4 cm in sterile container.
Comment:	Only send where there is evidence of infection. Urinary catheters not tested. If delay refrigerate @ 2-8°C.
Turnaround:	3 working days
Report:	Any clinically significant isolate with the appropriate sensitivities
Cat Scratch Disease Antibodies	
See "Bartonella Serology"	
CD34 Viability	
Laboratory:	Haematology
Specimen:	Frozen sample supplied from cryobiology lab, with special request form correctly filled
Comment:	Requires prior arrangement with flowcytometry
Turnaround:	1 day
Ref. Range	Not available
CEA	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
Cerebrospinal Fluid (Molecular analysis for Pathogens)	
Laboratory:	Medical Microbiology
Specimen:	0.5 mL CSF in plain leak-proof sterile container
Turnaround:	1 week (Verbal report available on detected targets)
Report:	Targets Detected/Not Detected.
Cerebrospinal Fluid – Culture / Microscopy	
Laboratory:	Medical Microbiology
Specimen:	3 specimens in sterile containers hand delivered to Medical Microbiology without delay.
Comment:	If Xanthochromia is requested a CSF sample should be received in the laboratory light protected/wrapped in tinfoil with accompanying 'CSF Xanthochromia request form' which is available in GUH Useful resources in the Biochemistry folder. Culture reported only on CSFs with an elevated cell count.
Turnaround:	Microscopy: 2 hours. Culture: 3 days.
Report:	Microscopy & Culture
Cerebrospinal Fluid – Viral PCR	
Laboratory:	Medical Microbiology
Specimen:	0.5 mL CSF in plain leak-proof sterile container
Comment:	Available only by prior arrangement with Microbiology Medical Staff
Turnaround:	1 week (Verbal report available on detected targets)
Report:	Targets Detected/Not Detected
Cerebrospinal Fluid - Cytology	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	3ml – 20 mL cerebral spinal fluid, lumbar puncture or ventricular tap in a 20 mL universal container. Refrigerate overnight if necessary as the cells are sensitive to temperature and cellular degeneration occurs if left at room temperature for extended periods of time.

Comment:	Indicate clinical history on test requisition and reason for test. Submit immediately to laboratory. Fixative may NOT be added if specimen is to be shared with microbiology for assessment. Please submit to microbiology department directly and request Urgent personal delivery directly from Microbiology for subsequent Cytological assessment. Please note there is no on call or emergency out of hours service available in the Diagnostic Cytology laboratory. Specimens must be received by 16:00 h for same day processing. There is no weekend service available in Diagnostic Cytology. Note: Cytology will not be performed on a ?CJD or a CJD sample
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells. Detection of infectious organisms.

Cerebrospinal Fluid - Glucose	
Laboratory:	Clinical Biochemistry
Specimen:	1.5 mL CSF specimen
Comment:	Send all CSF samples to Micro for processing, send simultaneous plasma glucose specimen
Turnaround:	1 – 3 hours
Ref. Range:	CSF Glucose level is normal approximately two thirds of the plasma glucose value

Cerebrospinal Fluid - Lactate	
Laboratory:	Clinical Biochemistry - referred to external laboratory for analysis
Specimen:	300 µL CSF in a Fluoride Oxalate tube
Comment:	Advisable to contact lab in advance of taking specimen
Turnaround:	3 days
Ref. Range:	On report form

Cerebrospinal Fluid - Neurodegenerative biomarkers (CSF Tau/Phospho Tau/ Beta amyloid)	
Laboratory:	Immunology – referred to Clinical Chemistry, Tallaght University Hospital
Specimen:	CSF minimum 2mL required for analysis
Comment:	CSF by LP; received in Blue top Sarstedt CSF Collection tube (contact lab for supply of tubes)
Turnaround:	2-3 weeks
Report:	Refer to TUH for full report

Cerebrospinal Fluid - Protein	
Laboratory:	Clinical Biochemistry
Specimen:	1.5 mL CSF specimen
Comment:	Send all CSF samples to Micro for processing
Turnaround:	1 – 3 hours
Ref. Range:	On report form

Cerebrospinal Fluid – Oligoclonal bands and CSF IgG Index	
Laboratory:	Immunology
Specimen:	Minimum of 0.5mL of CSF specimen **and** 5.0 mL blood in plain gel tube.
Comment:	Sample must be received in the lab within 7 days of collection.
Turnaround:	15 working days
Report:	See report form including interpretative comment

Cerebrospinal Fluid Shunt	
Laboratory:	Medical Microbiology
Specimen:	4 cm cut from line placed in a sterile container.
Comment:	Only send where evidence of infection. If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Any clinically significant isolate with the appropriate sensitivities

Ceruloplasmin	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	Male: 0.15-0.3 g/l Female: 0.16-0.45 g/L

Cervical Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. If delay refrigerate @ 2-8^{O}C.
Comment:	Endocervical / Urethral swabs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required.
Turnaround:	4 working days
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.
***Chlamydia pneumoniae/C. psittaci/C. abortus* PCR**	
Laboratory:	Virology: -referred to UKHSA respiratory and vaccine preventable bacteria reference unit (RVPBRU) Colindale
Specimen:	BAL
Comment:	Serological testing in which acute and convalescent blood samples are tested for antibodies has historically been used for psittacosis diagnosis but is no longer considered best practice and has been replaced by respiratory tract PCR diagnosis. Clinical details and risk factors required for referral.
Turnaround:	1-2 weeks
Report:	Detected / Not Detected
***Chlamydia trachomatis* antibodies.**	
Laboratory:	Virology. Referred to HPA, Bristol,
Specimen:	7ml blood in a plain gel tube
Comment:	Infertility testing in female patients only. This test is not useful for the diagnosis of symptomatic genital infections but may assist in the diagnosis of tubal factor infertility. If current *C. trachomatis* infection is suspected please send a specimen for PCR testing.
Turnaround:	1-3 weeks
Report:	Detected / Not Detected
***Chlamydia trachomatis* (CT) Nucleic Acid Amplification Test (NAAT) multiplex PCR – NG and on request TV.**	
Laboratory:	Virology
Specimen:	Abbott Multicollect specimen (e.g. urine, genital, rectal, throat, conjunctiva swab) delivered to laboratory <24 hr of collection. If delay refrigerate @ 2-8^{o}C.
Comment:	Asymptomatic and symptomatic testing as per British Association of Sexual Health & HIV (BASHH) guidelines 2023: First void urine recommended for anyone with a penile urethra; Vulvovaginal swabs recommended for anyone who has a vagina; Throat, rectal, conjunctival swabs guided by history. See specimen collection guidance to minimise invalid results.
Turnaround:	10 working days
Report:	Detected /Invalid/ Not Detected
Chloride	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Chloride (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24hr urine collection
Turnaround:	1 working day
Ref. Range:	On report form
Cholesterol	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Ideally a patient should fast for 12 hours. However, if a patient is unable or unwilling to fast for 12 hours a specimen taken after a 9 hour fast is acceptable
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days ESCG Target Value: Standard <5.0mmol/L High-Risk <4.0mmol/L

Cholesterol/HDL Ratio	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Calculated parameter
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Interpretation:	High risk >5.0, desirable <3.5.

Cholinesterase Phenotyping	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	4.0 mL K^+ EDTA blood
Turnaround:	1 – 3 weeks
Report:	On report form including interpretative comment

Chromogranin A/B	
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	4.0mL K+ EDTA, on melted ice
Turnaround:	1-3 weeks
Ref. Range:	On report form

Chromosomal Analysis
Refer to Cytogenetic

Citrate (Urine)	
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis.
Specimen:	24 hr plain urine collection acidified by the lab on arrival. For paediatric patients, a spot urine acidified by the lab on arrival will be sufficient.
Turnaround:	Approximately 2 weeks.
Reference Interval:	On report if applicable.

Clostridium difficile Toxin B gene detection	
Laboratory:	Medical Microbiology
Specimen:	Faeces 1-2 g during acute phase of illness in leak proof laboratory container. If delay 24h refrigerate @ 2-8^{O}C. > 72 h – freeze @ -20^{O}C.
Comment:	*C. difficile* requests are appropriate in particular in hospitalized patients who have developed diarrhoea while receiving antimicrobial agents.
Turnaround:	5 working days
Report:	C. difficile toxin B gene Detected/ Not Detected An additional test, for detection of *Clostridium difficile* toxin, will be performed on all stools which have *C. difficile* toxin gene detected. This will be reported as *C. difficile* toxin Detected/ Not Detected including relevant interpretative comments.

Clozapine (Clozaril)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0 mL K^+ EDTA blood
Turnaround:	1 – 3 weeks
Therapeutic Range:	On report form

Coagulation Factor Assays (incl Factors – II, V, VII, VIII:C, IX, XI, XII, and FX)	
Laboratory:	Haematology
Specimen:	2 x 2.7 mL blood specimens in 0.109m Sodium Citrate tubes, (1.0 mL Paediatric tubes are available).
Comment:	Prior arrangement with the coagulation laboratory, contact 091 544995. It is important that the specimen container is filled to the mark.
Turnaround:	1 day for routine specimens. Specimens with emergency form 2 hours, in consultation with the Laboratory. Telephoned requests for faster turnaround time can be accommodated when specifically requested.
Ref. Range:	See individual assay

Coagulation Factor XIII	
Laboratory:	Haematology: referred to NCHCD, St James's Hospital
Specimen:	2 x 2.7 mL blood specimens in 0.109m Sodium Citrate tubes, (1.0 mL Paediatric tubes are available).
Comment:	Prior arrangement with the coagulation laboratory, contact 091 544995. It is important that the specimen container is filled to the mark.
Turnaround:	4 weeks
Ref. Range:	Refer to report
Coagulation Screen	
Laboratory:	Haematology
Specimen:	2.7 mL blood specimens in 0.109m Sodium Citrate tubes, (1.0 mL Paediatric tubes are available). Do not refrigerate specimen. To be received in lab within 6 hours of draw.
Comment:	Profile includes, PT, INR, derived Fibrinogen and APTT. Details of anticoagulant therapy required. Must fill bottle to mark. INR is used to monitor warfarin. APTT may be used to monitor Heparin therapy.
Turnaround:	1 day for routine specimens. Specimens with emergency card 2 hours. Telephoned requests for faster turnaround time can be accommodated when specifically requested.
Ref. Range:	Refer to report
Cocaine	
See "Urine Drugs of Abuse Screen"	
Coeliac Screen	
See 'Anti-Tissue TransGlutaminase (tTG) Antibodies'	
Cold Agglutinins	
Laboratory:	Blood & Tissue Establishment
Specimen:	6.0 mL EDTA K^2E blood
Comment:	Specimen needs to be transported to the Blood & Tissue Establishment in a flask at 37ºC before 15.30
Turnaround:	Within 12 h
Ref. Range:	N/A
Complement: C1 Esterase Inhibitor	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	0.15 – 0.43 g/L
Complement: C1 Esterase Inhibitor Functional Assay	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube.
Comment:	Must arrive in Immunology on the same day it was taken. Time and date of collection must be stated on request form
Turnaround:	5 weeks
Ref. Range:	70-130%
Complement: C1q	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Comment:	Specimen referred for testing if CH100 functional activity is abnormal.
Turnaround:	11 weeks
Ref. Range:	Refer to Report
Complement: C2	
Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Comment:	Only if abnormal CH100 or CH100A Functional Activity
Turnaround:	6 weeks
Ref. Range:	On report form including interpretative comment

Complement: C5/C6/C7/C8/C9

Laboratory:	Immunology: – referred to Eurofins Biomnis
Specimen:	5.0 mL blood in plain gel tube
Comment:	Only if abnormal CH100 or CH100A Functional Activity
Turnaround:	6 weeks
Ref. Range:	On report form including interpretative comment

Complement: C3/C4

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	3 working days
Ref. Range:	C3: 0.75 – 1.86 g/L
	C4: 0.13 – 0.49 g/L

Complement: C3 Nephritic Factor

Laboratory:	Immunology: – referred to Immunology Dept, Northern General Hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Positive/Negative

Complement: Functional Activity CH100 (Total) and CH100A (Alternate Pathway)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	Must arrive in Immunology within 6 hrs of collection. Time and date of collection must be stated on the request form.
Turnaround:	5 weeks
Ref. range:	Refer to report form

Conjunctivitis (Bacterial Culture)

Laboratory:	Medical Microbiology
Specimen:	Swab of conjunctiva in transport medium
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Culture report: Any clinically significant isolate with the appropriate sensitivities.

Conjunctivitis (Chlamydia trachomatis)

See ***Chlamydia trachomatis*** **(CT) Nucleic Acid Amplification Test (NAAT) multiplex PCR**

Connective Tissue Disease Screen (CTD)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Ref. Range:	Negative: <1.0
	Positive: >1.0. Positive CTD screen results will have further testing for ANA (by indirect immunofluorescence), anti-ENA and anti-dsDNA.

Copper

Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	7.0 mL blood in a Na^{+}. EDTA trace element tube (available from Clinical Biochemistry lab).
Turnaround:	3weeks
Ref. Range:	On report form

Copper (Urine)

Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	24 hour urine sample
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Corneal Scrapings / Intraocular Fluids	
Laboratory:	Medical Microbiology
Specimen:	Pre-inoculated media available from lab/ If sufficient fluid use sterile container.
Comment:	Contact Laboratory to collect fresh culture plates and slide for corneal scrapings. Deliver to Laboratory immediately.
Turnaround:	5-7 days
Report:	Clinically significant isolate with the appropriate sensitivities
Cortisol	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Ref. Range:	On report form
Cortisol (Urine)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
COVID-19 see SARS	
See "SARS CoV-2 (PCR)"	
Coxiella burnetii IgM Antibodies (Q fever)	
Laboratory:	Virology: referred to the Rare and Imported Pathogens Reference Laboratory
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Include **date of onset of symptoms and clinical details.** If there is a clinical suspicion of chronic infection, please discuss with a consultant microbiologist.
Turnaround:	2-3 weeks.
Report:	See reference lab report including interpretative comment.
Coxsackie B Virus	
See "Enterovirus"	
C Peptide	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL fasting blood in a plain tube delivered immediately to the laboratory
Turnaround:	1 week.
Ref. Range:	On report form
Creatine Kinase (CK)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Creatinine	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Creatinine (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine sample
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

Creatinine Clearance	
Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine in plain container and 7.0mL blood in plain gel tube taken at some point during the urine collection. It is important that the blood and urine are received in the laboratory as a matched pair.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form
Interpretation:	Creatinine clearance may be higher during normal pregnancy due to glomerular hyperfiltration.
Creutzfeldt - Jakob disease (CJD, 14-3-3 RT-Quic)	
Laboratory:	Medical Microbiology: Referred to Beaumont Hospital and then onwards to Edinburgh
Specimen:	2 - 5mls of CSF
Comment:	Available only in very specific circumstances and with prior approval of a Consultant Microbiologist.
Turnaround:	3 - 6 weeks
Report:	Positive/Negative
CRP (C Reactive Protein)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Cryoglobulins	
Laboratory:	Immunology
Specimen:	10 .0 mL blood in plain tube (provided by lab), 10.0 mL EDTA blood, transported immediately at 37°C. Contact laboratory who will provide suitable flask for transport of sample at 37°C. Refer to Section 11.9 for detailed instructions on sample collection.
Comment:	Requests accepted Mon – Thurs 8h-16h. Friday 8h -13h.
Turnaround:	8 working days
Report:	Positive/Negative. If positive then quantified by Cryocrit and typed by Immunofixation
Cryptococcal Antigen	
Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Infection with *Cryptococcus neoformans* typically associated with immunosuppression. Please state clinical details, symptoms, date on onset.
Turnaround:	1 week unless discussed as urgent test.
Report:	Detected/Not Detected
Cryptosporidium spp	
Laboratory:	Medical Microbiology
Specimen:	Faeces 1-2 g during acute phase of illness in leak proof Laboratory container. If delay refrigerate @ 2-8°C.
Comment:	*Cryptosporidium spp* is tested routinely on all outpatients.
Turnaround:	2 working days
Report:	*Cryptosporidium* DNA detected /Not detected.
Crystals for Uric acid assessment	
See Joint Aspirates Department of Histopathology, Cytopathology and Molecular Pathology	
CSF – Culture & Microscopy /Glucose /Protein /Lactate	
See "Cerebrospinal Fluid – Culture & Microscopy /Protein /Glucose /Lactate"	
CSF- Cerebrospinal Fluid- Cryptococcal Antigen(CrAg)	
Laboratory:	Medical Microbiology
Specimen:	CSF (150uls)
Turnaround:	1 working day
Result	**Cryptococcal Antigen(CrAg) Detected/Not Detected**

CSF- Cerebrospinal Fluid- Flow Cytometry	
Laboratory:	Haematology
Specimen:	Transfix tube which must be collected from flowcytometry dept prior to lumbar puncture. If this is not available use RPMI prepared by the flowcytometry dept which uses an accurate volume of 2ml RPMI added to the CSF container. Collect between 1.5 – 2.0ml of CSF into the transfix and mix by inversion 5-10 times. CSF sample must be transported immediately to the flow cytometry laboratory where processing begins.
Comment:	Requests for flow cytometry tests should only be received Monday –Thursday between 9am and 5pm unless prior arrangements have been made with Flow Cytometry. Prior arrangement is required with flowcytometry for CSF analysis. Samples must be returned directly after sampling, to the flow cytometry lab. Full clinical information and reason for request must accompany specimen
Turnaround:	3-5 working days
Ref. Range:	Interpretation by Consultant Haematologist on report form.

CSF – Oligoclonal bands and CSF IgG Index
See "Cerebrospinal Fluid – Oligoclonal bands and CSF IgG Index"

CSU – Catheter Urine	
Laboratory:	Medical Microbiology
Specimen:	Specimen of Urine in Urine vacuum tube container.
Comment:	Contact Laboratory Medical staff as routine submission of CSU is not appropriate. If delay refrigerate @ 2-8^{O}C.
Turnaround:	Microscopy: 4 hrs for Urines received 8am to 12 midnight. Paeds Urines only processed post-midnight. Culture 3 working days.
Report:	Microscopy: Cell count& Culture and sensitivities if appropriate

Curettings	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Cyanide	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Cyclosporin (Neoral)	
Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL K^{+} EDTA whole blood
Comment:	Collect sample pre-dose. State date/time of sample collection clearly on request form.
Turnaround:	1 week
Ref. Range:	Patient specific

Cystic Fibrosis – Genetic Test	
Laboratory:	Immunology: – referred to Department of Clinical Genetics, CHI, Crumlin, Dublin.
Specimen:	5.0 mL EDTA whole blood.
Comment:	It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully. A CF patient information request form (CF PID), may be submitted, CHI request forms can be download from https://www.childrenshealthireland.ie
Turnaround:	Up to 10 weeks
Report:	Refer to report- including interpretative comment

Cyst Fluid
Department of Histopathology, Cytopathology and Molecular Pathology. Please refer to Aspirates/ effusions

Cytogenetics: Chromosome Analysis /Karyotyping Adults (age >18 years)	
Laboratory:	Immunology: - referred to Eurofins Biomnis (Mon – Fri service). .
Specimen:	5.0 mL of blood in Lithium Heparin tube (to be kept at room temperature only)
Comment:	Eurofins Biomnis request form to be submitted with samples for testing (available at https://www.eurofins.ie/biomnis/test-information/test-request-forms) Clinical details must be provided.
Turnaround:	25 working days
Report:	Refer to report- including interpretative comment

Cytogenetics: Chromosome Analysis / Karyotyping Paediatric (age <18 years)	
Laboratory:	Immunology: - referred to Department of Clinical Genetics, CHI, Crumlin
Specimen:	2.0 mL of blood in Lithium Heparin tube (to be kept at room temperature only)
Comment:	Sample preferably to arrive in lab by 12:00 on Thursdays for transport to DCG It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully. CHI request forms can be download from https://www.childrenshealthireland.ie
Turnaround:	up to 2 months
Report:	Refer to report- including interpretative comment

Cytogenetics: Microarray / aCGH	
Laboratory:	Immunology: - referred to Department of Clinical Genetics, OLCH, Crumlin
Specimen:	5.0 mL of blood EDTA
Comment:	It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully. CHI request forms can be download from https://www.childrenshealthireland.ie
Turnaround:	Up to 5 weeks
Report:	Refer to report- including interpretative comment

Cytomegalovirus (CMV – PCR)	
Laboratory:	Virology: - referred to the National Virus Reference Laboratory, Dublin
Specimen:	8ml K2EDTA Greiner tube; Tissue biopsies; Urine. Specimens must be delivered directly to a staff member in the Virology laboratory within 24 hours of phlebotomy.
Comment:	**Clinical details essential.** Surveillance of patients at risk of active CMV infection / disease, monitoring response to immune suppression dose reduction and/or antiviral therapy, or suspected active/primary CMV infection. Organ or BMT recipient, immunocompromised host, **congenital CMV infection** (CMV hearing, code "MCMH")
Turnaround:	1 – 3 weeks
Report:	Detected/Not Detected. Quantitative assay: IU/mL / log10 IU/mL

Cytomegalovirus (CMV) IgM Antibody	
Laboratory:	Virology
Specimen:	7.0 ml blood in a plain gel tube
Comment:	Please provide clinical details re symptoms, pregnancy, immunosuppression. IgM detection may signify primary CMV infection or reactivation. Blood transfusions or other blood products within past several months may affect results. Cross reactivity with other viruses may also occur.
Turnaround:	1-2 days
Report:	Detected / Not Detected (CMV IgG testing may also be required to interpret)

Cytomegalovirus (CMV) IgG Antibody	
Laboratory:	Virology
Specimen:	7.0 ml blood in a plain gel tube
Comment:	Please provide clinical details re symptoms, pregnancy, immunosuppression. IgG detection signifies previous CMV infection. Further testing e.g. IgM, avidity, PCR testing may be indicated in some instances pending clinical discussion.
Turnaround:	1-2 days
Report:	Detected / Not Detected

Cytotoxic Antibodies (solid organ transplantation)	
Laboratory:	Immunology: - referred to Tissue Typing Laboratory, Immunology, Beaumont Hospital, Dublin.
Comment:	Discuss with tissue typing lab in Beaumont
Specimen:	5 ml blood in plain gel tube
Turnaround:	4 weeks
Ref range:	Refer to report, issued by Beaumont.
D-Dimers	
Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube. Specimen must be tested within 24 hours of draw. One specimen sufficient for D-Dimer and Coagulation screen. D-Dimer can be added onto a Coagulation screen request that is less than 24 hours old by telephone or by request form.
Turnaround:	1 day routine specimens. Specimens received on emergency form 2 hours.
Ref. Range:	Refer to report
Dengue fever Antibodies – Must discuss with consultant Microbiologist	
Laboratory:	Virology: -referred to the National Virus Reference Laboratory, Dublin.
Specimen:	7.0 mL blood in a plain gel tube.
Comment:	**Available only if clinical details and travel history provided.**
Turnaround:	1 – 3 weeks
Report:	Detected/Not detected
Dermatophytosis	
Laboratory:	Medical Microbiology
Specimen:	Hair, Nail clippings, skin scrapings in Dermapak.
Comment:	Refer to Medical Microbiology section for collection & transport. If delay store at room temperature.
Turnaround:	Microscopy: 1 week. Culture: 5 to 6 weeks.
Report:	Microscopy & Culture
DHEA Sulphate	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0 mL blood in a plain tube
Comment:	Assay only available by request from Endocrine Team or by prior agreement with Dr. Damian Griffin/Dr. Verena Gounden
Turnaround:	3 weeks
Ref. Range:	On report form
Digoxin	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen six hours post dose, Hypokalaemia is associated with an enhanced response to digoxin. Potassium should always be measured when digoxin toxicity is suspected.
Turnaround:	Urgent: 1hour. All other requests: same day
Therapeutic Range:	On report form
Dihydropyrimidine Dehydrogenase (DPD) Activity	
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis,
Specimen:	K^+ EDTA blood
Turnaround:	1 – 3 weeks
Report:	See report form
Diphtheria (Culture of Throat swab)	
Laboratory:	Medical Microbiology
Specimen:	Swab in charcoal medium. If delay refrigerate @ 2-8^{O}C.
Comment:	Contact Laboratory prior to sending swab to ensure fresh media is present.
Turnaround:	1 week
Report:	Culture Report: Any clinically significant isolate with the appropriate sensitivities

Direct Coombs Test	
Laboratory:	Blood & Tissue Establishment
Specimen:	6.0 mL EDTA K^2E blood
Turnaround:	1 hour
Ref. Range:	N/A
Dopamine	
Laboratory:	Clinical Biochemistry, referred to external laboratory for analysis
Specimen:	Paediatrics <12 years, only sent for query neuroblastoma, 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	12 working days
Interpretation:	As per returned report
Duodenal Aspirate	
Laboratory:	Medical Microbiology
Specimen:	Fluid in sterile universal container
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Culture Report: Any clinically significant isolate with the appropriate sensitivities.
Duodenal Smear for *Giardia intestinalis*trophozoites.	
Laboratory:	Medical Microbiology
Specimen:	Smear on slide. If delay refrigerate @ 2-8^{O}C.
Turnaround:	1 week
Report:	*Giardia intestinalis* detected / not detected
Ear Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab any pus or exudate with in transport medium
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Culture Report: Any clinically significant isolate with the appropriate sensitivities
Echinococcus (Hydatid cyst) antibodies	
Laboratory:	Virology: -referred to Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	If compatible exposure history and evidence of cystic lesion(s) in an organ (esp. liver)
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected
Ecstasy	
See "Urine Drugs of Abuse Screen"	
Effusions	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Collect 10-20 ml fresh specimen into a twist top leak proof 20ml or 50 ml sample bottle containing Shandon Cytospin collection fluid (green fixative solution available from Laboratory).Refrigerate overnight if necessary
Comment:	Indicate clinical history on test requisition, and reason for test. Do not submit drainage bags or large volumes of fluid for disposal in Laboratory
Turnaround:	80% by 5 working days.
Report:	Detection of neoplastic and non-neoplastic cells
eGFR	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in plain gel tube
Turnaround:	Urgent: 1 hour. Priority: 3 hours. Routine: 4 working days
Comment:	Calculated parameter
Interpretation:	On report form

EGFR Mutation analysis	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology Laboratory, arrange via consultant pathologist.
Comment;	Testing available on request by Pathologist.
Referrals	Contact the Department of Histopathology, Cytopathology and Molecular pathology on 4078
Turnaround;	5 – 10 working days after request by Pathologist received.
Report:	Integral part of Histopathology report issued by Division of Anatomic Pathology, Department of Histopathology, Cytopathology and Molecular Pathology.
Electron Microscopy	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Fresh tissue required for referral to external laboratory.
Comment:	Discuss with appropriate Consultant Histopathologist at least 24 hours in advance of surgery.
Report:	Histological diagnosis
Endocervical Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium
Comment:	Endocervical / Urethral swabs are routinely cultured for *N. gonorrhoeae*. If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Culture Report: Any clinically significant isolate with the appropriate sensitivities.

***Enterobius vermicularis* (Sellotape slide for Pinworms)**	
Laboratory:	Medical Microbiology
Specimen:	Apply sellotape to anal area at night or early morning, fix to slide, send to Laboratory. If delay refrigerate @ 2-8^{O}C.
Turnaround:	2 working days
Report:	Presence or Absence of *E. vermicularis.*
Enterovirus (PCR)	
Laboratory:	Medical Microbiology
Specimen:	0.5 mL CSF in plain leak-proof sterile container; (Stool, respiratory secretions, blood (8ml K2EDTA Greiner tube), vesicular fluid
Comment:	On Consultant Microbiologist request. **Serology is NOT available.** Please state **clinical details; date of onset and if recent travel.**
Turnaround:	1 week
Report:	Enterovirus RNA: Detected/ Not Detected.
Epstein – Barr Virus (EBV) Antibodies	
Laboratory:	Virology:
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Infectious Mono investigation - also consider testing for HIV, CMV and Toxoplasmosis. Provide clinical details to enable result interpretation.
Turnaround:	1 – 2 days
Report:	Detected/Not Detected
Epstein – Barr Virus (EBV) PCR	
Laboratory:	Virology: - referred to the National Virus Reference Laboratory, Dublin
Specimen:	8ml K2EDTA Greiner tube Specimens must be delivered directly to a staff member in the Virology laboratory within 24 hours of phlebotomy
Comment:	Used to monitor transplant patients for primary or reactivated EBV infection and to elucidate suspected primary EBV infection in immunocompetent individuals. In very specific situations it can be used to monitor patients with EBV-associated tumours.
Turnaround:	1 – 3 weeks
Report:	Detected/Not Detected

Erythropoietin	
Laboratory:	Haematology: Referred to MedLab Pathology.
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	2 weeks
Ref. Range:	Refer to report
ESR (Erythrocyte Sedimentation Rate)	
Laboratory:	Haematology
Specimen:	Minimum 2mls blood in EDTA purple top tube for ESR and FBC. Paediatric FBC and ESR request require a 3 ml Adult EDTA purple top tube.
Comment:	Requests should be received by the laboratory within 24 hours of phlebotomy.
Turnaround:	1 day routine specimens. Telephoned requests for faster turnaround time can be accommodated on particularly urgent specimens Ref. Range: Refer to report
Ethylene Glycol	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	EDTA, Li. Heparin or plain non-gel tube
Comment:	Contact Dr. Damian Griffin/Dr Verena Gounden who will advise as to the necessity for having the assay referred as an emergency
Turnaround:	Arranged for each assay
Ref. Range:	On report form
Extended Spectrum Beta Lactamase (ESBL) culture	
Laboratory:	Medical Microbiology
Specimen:	Rectal swab in transport medium/Faeces sample. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Restricted to specific groups of hospitalized patients. Non-hospitalized patients are screened by prior arrangement with a Consultant Microbiologist.
Turnaround:	3 working days
Report:	ESBL isolated / not isolated
Eye Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium (charcoal)
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	3 working days (4-5 days in case of Neisseria gonorrhoea culture in Neonatal Eye swabs <4weeks)
Report:	Culture Report: Any clinically significant isolate with the appropriate sensitivities.
Fabry's Disease	
Laboratory:	Clinical Biochemistry-Referred to External Laboratory for Analysis
Specimen:	Two 5.0 mL K+ EDTA blood, fully filled.
Comment:	Consent may be required if additional testing is performed
Turnaround:	4 weeks
Report:	On Report Form
Factor Inhibitor Studies	
Laboratory:	Haematology
Specimen:	3 x 2.7 mL blood in a 0.109m Sodium Citrate tube
Comment:	Prior arrangement with coagulation laboratory necessary. Must fill bottle to mark.
Turnaround:	1 week
Ref. Range:	N/A
Factor V Leiden Mutation	
Laboratory:	Haematology: referred to NCHCD, SJH, Dublin
Specimen:	5.0 ml blood in EDTA tube
Comment:	APCR <2 or positive lupus only will be sent to SJH for testing. This must be written on the Haematology request form. A signed patient consent form for genetic testing is required by the laboratory before analysis can be processed.

Turnaround:	4 weeks
Ref Range:	N/A

Faecal Elastase	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	100 mg minimum formed faeces sample
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Faeces – Molecular analysis, Microscopy, Culture and Antigen Detection	
Laboratory:	Medical Microbiology
Specimen:	1-2 g faeces collected in acute phase of illness in leak proof container. If delay refrigerate @ 2-8^{O}C
Comment:	*Shigella* Spp. survival may be compromised @ 2-8^{O}C – delay reduces isolation
Turnaround:	3 working days
Report:	Molecular: Bacterial DNA Detected/Not Detected. Culture: When Salmonella DNA or Shigella/EIEC DNA is detected. Referral to Cherry Orchard when VTEC DNA is detected.

Farmers Lung Antibodies) ((*Micropolyspora faenii* aka *Saccharopolyspora rectivirgul* and *Thermoactinomyces vulgaris* antibodies)	
Laboratory:	Virology: - referred to PHL, Cumberland Infirmary, Carlisle CAZ 7HY
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Available only in specific circumstances and with prior approval of a Consultant Microbiologist. Farmer's lung is a disease caused by an extrinsic allergic alveolitis (type III hypersensitivity reaction) following the chronic inhalation of the dust of mouldy hay. Please state **relevant clinical details and risk factors.**
Turnaround:	2 – 3 weeks
Report:	Detected/Not detected

FDP's (Fibrinogen degradation products)	
Laboratory:	Haematology
Specimen:	2.0 mL blood in special FDP bottle supplied on request by coagulation laboratory
Comment:	Must fill bottle to mark
Turnaround:	1 day
Ref. Range:	Refer to report

Ferritin	
Laboratory:	Haematology
Specimen:	5.0 mL blood in a plain gel tube. Specimen to be received within 24hrs of phlebotomy for whole blood and 3 days if sample spun.
Turnaround:	4 days
Ref. Range:	Refer to report

Filaria Antibodies	
Laboratory:	Virology: -referred to Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Available only in specific circumstances and with prior approval of a Consultant Microbiologist. **Clinical details essential** prior to referral: Filaria serology is a non-specific screening test that is positive in many types of filariasis and cross-reacts in cases of strongyloidiasis. It is most useful in the diagnosis of Tropical Pulmonary Eosinophilia (TPE). This test cannot determine the species of Filaria infection.
Turnaround:	2 – 3 weeks
Report:	Weak Positive: Level 1 - 2; Strong Positive: > Level 5

Fine Needle Aspiration Biopsy - FNAB	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen to laboratory in 10% Neutral Buffered Formalin.
Turnaround:	80% by 5 working days
Report:	Histological diagnosis

Fine Needle Aspirates (FNAS) of breast, thyroid, axilla, parotid, submandular, lymph node and cysts.

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Superficial and deep seated lesions. Deep seated lesions that need ultrasonic, CT or fluoroscopic guidance may be required. Use a 22 – 25 gauge fine needle and a 10 – 20 mL syringe for collection of specimen. Clearly label two frosted glass slides with patients name, DOB, and /or BN. Prepare thin even smears. For optimal diagnosis, air dry one slide for diff quik stain, please label as 'Air Dried. Immediately after preparation, spray a complete even coating of Cell-Fixx onto the other slide(s) from a distance of 25 – 30 cm (10 – 12 inches). Fixed slides should be labelled in pencil with patient Name DOB and or BN. Labelling should be carried out before spray fixing. Fixed and air dried slides should be placed in slide mailers clearly labelled on the outside with patient's addressograph. Needle wash may be collected into Shandon Cytospin Collection Fluid in a Universal container green fixative solution and submitted to the laboratory for processing. Please indicate exact location of sample site on request form and specimen container. Pathologist assisted FNAs must be prebooked by contacting the laboratory office ext.: 4078/4492 or Cytology laboratory Prep ext. 4883. Contact with Pathologist rostered on Cytology may also be made via switchboard.
Comment:	Additional Sample may be taken for Flow cytometry if clinically indicated
Turnaround:	80% by 5 working days
Report:	Correlated with clinical presentation. Allow on site evaluation, rapid turnaround time.
Flecainide Acetate	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL blood in a non-gel tube
Turnaround:	1 – 3 weeks
Target Range:	On report form
Flow Cytometry (Immunotyping of Leukaemias and Lymphomas)	
Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood or Bone Marrow aspirate in EDTA or Lymph Node Biopsy in RPMI
Comment:	Prior arrangement with consultant Haematologist or SPR Requests for flow cytometry tests should only be received Monday –Thursday between 9am and 5pm unless prior arrangements have been made with Flow Cytometry.
Turnaround:	3 - 5 days
Report:	Contact Consultant Haematologist.
FLT3 – Mutation	
Laboratory:	Haematology: -referred to CMD Laboratory, St James Hospital, Dublin 8.
Specimen:	3.0 mL K^3 EDTA blood, or Bone Marrow in RPMI.
Comment:	Arrange through Haematology Registrar, or Consultant Haematologist. Requires CMD request form.
Turnaround:	1 Month
Report:	See report form.
Foetus	
Laboratory:	Refer to Autopsy Section
Folate (Serum)	
Laboratory:	Haematology
Specimen:	5.0 mL blood in a plain gel tube. Specimen to be received within 24hrs of phlebotomy for whole blood and 2 days if sample spun.
Turnaround:	4 days
Ref. Range:	Refer to report
Fragile X Chromosome	
Laboratory:	Immunology: - referred to Department of Clinical Genetics, CHI, Crumlin
Specimen:	5.0 mL blood in EDTA tube
Comment:	It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully. CHI request forms can be download from www.childrenshealthireland.ie
Turnaround:	up to 26 weeks

Ref Range:	See report- including interpretative comment

Free light chains		
Laboratory:	Immunology	
Specimen:	5.0 mL blood in plain gel tube	
Turnaround:	5 working days	
Ref. Range:	Kappa light chains	3.3 – 19.4 mg/L
	Lambda light chains	5.7 – 26.3 mg/L
	Kappa / Lambda Ratio	0.26 – 1.65
	Kappa / Lambda Ratio	0.37-3.1 applies for patients with stage 3 CKD or above

Fresh Tissue	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory UNFIXED.
Comment:	Lymph nodes for query lymphoma, Frozen section and Muscle biopsy to be confirmed with Consultant Histopathologist on frozens at least 24 hours in advance. Skin biopsies and renal biopsies for DIF to be confirmed with Histopathology laboratory staff at least 24 hours in advance. Health & Safety precautions
Report:	Histological diagnosis

Free T4
See “Thyroxine”

Frozen Sections	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Fresh tissue
Turnaround:	Same day
Comment:	Avoid if there is a danger of infection e.g. if tuberculosis is strongly suspected. Frozen sections will not be done where there is a danger of infection. Alternative approaches to rapid diagnosis can be discussed with the Consultant rostered on ‘frozens’.
Prior Arrangement:	Please book frozen section 24 hours in advance with the Consultant Histopathologist rostered for ‘frozens’ (ext. 4589). If possible put the operation at the beginning of the operation list. If the operation is delayed or if it is subsequently found that the frozen section is not required, please notify the Histopathology Department without delay at ext.: 4589.The unfixed tissue sample is transported directly to the laboratory by portering staff in a fully labelled accompanied by a fully completed request form. Include contact details for immediate call back of frozen section result. Tissue for frozen section must be handed directly to a Medical Scientist, NCHD or Consultant Histopathologist. Unbooked Frozen Sections: Frozen sections that are required but not booked during the ‘normal working hours’ (09:00-17:00h) must be discussed with the Consultant Histopathologist rostered for ‘frozens’ before any samples are taken.
Report:	Histological diagnosis

FSH	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form

Fructosamine	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	2 weeks
Ref. Range:	On report form

Full Blood Count	
Laboratory:	Haematology
Specimen:	3.0 mL K3 EDTA blood, (1.0 mL Paediatric tubes are available).
Comment:	After 24 hours, WBC differential and red cell indices are affected by EDTA changes. Ensure samples are not taken from a drip site as this results in dilution of the sample. In cases of platelet clumping special sample bottles (thrombo exact) are available upon request. For use in platelet counting only. Maximum age of sample that will be processed: 48 hours.
Turnaround:	1 day routine specimens. Specimen's received on emergency form 2 hours. For HDW specimens 45 minutes. For GP specimens 2 working days. Telephoned requests for faster turnaround time can be accommodated on particularly urgent specimens.
Ref. Range:	Refer to report
Fungal Microscopy and Culture	
Laboratory:	Medical Microbiology
Specimen:	Transport swab. Tissue / pus in sterile container. Hair, nail clippings, skin scrapings in Dermapak. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Refer to Medical Microbiology section
Turnaround:	Microscopy: 1 week. Culture: 5 to 6 weeks.
Report:	Microscopy: Presence or absence of Fungal elements. Culture: Growth / No Growth
G6PD Quantitation	
Laboratory:	Haematology: Red Cell Lab. Kings College Hospital.
Specimen:	3.0 mL K^{3} EDTA blood
Turnaround:	2 weeks
Ref. Range:	See report form
G6PD Screening	
Laboratory:	Haematology
Specimen:	3.0 mL K^{3} EDTA blood. (1.0 mL Paediatric tubes are available).
Turnaround:	1 day
Ref. Range:	N/A
~~**Galactomannan on Respiratory samples**~~	
~~Laboratory:~~	~~Medical Microbiology~~
~~Specimen:~~	~~3-5 mls of Untreated Sputum/Bal~~
~~Comment:~~	~~Not to be done routinely, all Galactomannan samples for analysis must be authorised by a Consultant Microbiologist before sending to St James's Hosp., Dublin.~~
~~Turnaround:~~	~~2 weeks~~
~~Report: Detected/ Not Detected~~**Galactomannan antigen EIA – Serum or Respiratory samples**	
Laboratory:	Virology (serum); Microbiology (resp): referred to Microbiology Dept, St. James' Hospital
Specimen:	7.0 mL blood in plain gel tube; 3-5 mls of untreated sputum/BAL. Refrigerate if not transporting immediately to laboratory.
Comment:	Only available in very specific cases and following approval by a Consultant Microbiologist. **Serum sensitivity in neutropenic patients not receiving posaconazole prophylaxis approx 80%. Itra or posaconazole antifungal prophylaxis reduce the sensitivity considerably. Non-neutropenic patients, serum sensitivity: 0-25%.** Some rarer fungi lack specificity; False positives may occur with beta-lactam antibiotics (e.g. piperacillin/tazobactam); certain foods (e.g. pasta, yoghurt) and in patients with permeable small bowel, e.g. mucositis. Respiratory samples may still be positive e.g. ventilated ICU patients with invasive aspergillosis, galactomannan detectable in ~85% of BAL samples and is the best means currently of establishing a probable diagnosis. Conversely, positive BAL galactomannan tests

may be not detectable within 3 days by antifungal therapy, so false negative results should be expected soon after anti-Aspergillus therapy is started.

Turnaround: 1 – 2 weeks
Report: Detected/ Not Detected

Galactose-1-phosphate

Laboratory: Clinical Biochemistry: - referred to external laboratory for analysis
Specimen: 3.0 mL Li Heparin blood.
Comment: Contact laboratory before collecting sample. Full clinical information and reason for request must accompany specimen
Turnaround: 1 – 3 weeks
Ref. Range: On report form

Galactose-1-phosphate uridyl transferase

Laboratory: Clinical Biochemistry: - referred to external laboratory for analysis
Specimen: 3.0 mL Li Heparin blood
Comment: Collect sample on Mon-Wed mornings. Full clinical information and reason for request must accompany specimen
Turnaround: 1 – 3 weeks Ref. Range: On report form

Galactomannan antibodies-see Galactomannan antigen EIA – Serum or Respiratory samples

~~Laboratory: Virology: -referred to the Department of Microbiology, St. James' Hospital, James Street, Dublin 8~~
~~Specimen: 7.0 mL blood in plain gel tube~~
~~Comment: Only available in very specific cases and following approval by a Consultant Microbiologist~~
~~Turnaround: 1 – 2 weeks~~
~~Report: Positive/Negative~~

Gamma-glutamyl-transferase (γ-GT)

Laboratory: Clinical Biochemistry
Specimen: 7.0 mL blood in a plain gel tube
Turnaround: Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range: On report form

Gastrin

Laboratory: Clinical Biochemistry: - referred external laboratory for processing
Specimen: Fasting EDTA sample sent to the lab on melting ice
Turnaround: 1 – 3 weeks
Ref. Range: On report form

Gastrointestinal Tract Hormones (GIT Hormones): incl. Pancreatic Polypep, C-Term Glucagon, Vasoactive Polypep, Somatostatin and CART

Laboratory: Clinical Biochemistry: - referred to external laboratory for analysis
Specimen: 4.0mL K^+ EDTA blood per hormone assay, on melted ice
Turnaround: 1 – 3 weeks
Ref. Range: On report form

Genital Swab

Laboratory: Medical Microbiology
Specimen: Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment: Only Endocervical swabs, Urethral swabs and IUCDs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required.
Turnaround: 3 working days.
Report: Any clinically significant isolate.

Gentamicin/Genticin	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube. Delay >2h refrigerate @2-8°C.
Comment:	State time collected and if Peak or Trough specimen
Turnaround:	Analysed during routine working hours only.
Therapeutic Range:	On report form
Glucagon	
See "Gastrointestinal Tract Hormones"	
Glucose	
Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL Vacuette FC mix tube NaF/Citrate/EDTA
Comment:	Fasting: Ideally a patient should fast for 12 hours. However, if a patient in unable or unwilling to fast for 12 hours a specimen taken after a 9 hour fast is acceptable".
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Group and Coombs	
Laboratory:	Blood & Tissue Establishment
Specimen:	EDTA K^2E 6.0 mL (cord blood specimen) EDTA K^2E 4.0 mL from infant
Turnaround:	4 hours
Ref. Range:	N/A
Group and Crossmatch	
Laboratory:	Blood & Tissue Establishment
Specimen:	EDTA K^2E 6.0 mL blood
Turnaround:	40 mins (for an urgent crossmatch)
Ref. Range:	N/A
Group and Hold	
Laboratory:	Blood & Tissue Establishment
Specimen:	EDTA K^2E 6.0 mL blood
Turnaround:	1 hour (for an urgent Group and Hold)
Ref. Range:	N/A
Growth Hormone	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube, must arrived in lab same day. It should only be requested as part of a dynamic function test. In general, a random growth hormone measurement has very little diagnostic value.
Turnaround:	3 weeks
Interpretation:	On report form
Gut Hormone Profile	
See "Gastrointestinal Tract Hormones"	
Haematinics (Vitamin B12 + Serum Folate + Serum Ferritin)	
Laboratory:	Haematology
Specimen:	5.0 mL blood in a plain gel tube. Specimen to be received within 24hrs of phlebotomy for whole blood and 2 days if sample spun and refrigerated.
Turnaround:	4 days
Ref. Range:	Refer to report
Haemochromatosis – C282Y, H63D and S65C Genetic Mutations	
Laboratory:	Immunology: - referred to Eurofins Biomnis, Dublin.
Specimen:	5.0 mL blood in EDTA tube
Comment:	Must specify genetic test on request form. The patient must be >16 years old and the EDTA sample must be fresh and not used for other testing.
Turnaround:	up to 2 weeks
Ref range:	On report form including interpretative comment. Paper report ONLY.

HbA_{1c}

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL EDTA blood
Turnaround:	2 working days
Ref. Range:	On report form

Haemoglobin A_2

See Haemoglobinopathy Screen

Haemoglobin F

See Haemoglobinopathy Screen

Haemoglobin S

See Haemoglobinopathy Screen

Haemoglobinopathy Screens

Laboratory:	Haematology referred to St James Hospital for patients greater than 16 years age. For patients less than 16 years, samples are referred to Crumlin Hospital
Specimen:	1 EDTA sample plus 1 serum required.
Comment:	Must request FBC and ferritin in addition to haemoglobinopathy for patients less than 16 years. Request form must give clinical details, transfusion history and ethnic origin of patient. Levels of HbA_2 will be affected by the presence of iron deficiency. Thalassaemia cannot be excluded in the presence of iron deficiency.
Turnaround:	4 weeks
Ref. Range:	On report form

Haemophilus influenzae B Antibodies (IgG)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	15 working days
Ref. Range:	Minimum Protective Level >0.15 mg/L Optimum Protective Level >1.00 mg/L

Haemosiderin (Urine)

Laboratory:	Haematology
Specimen:	First morning urine specimen in a plain universal container.
Turnaround:	3 - 5 days
Ref. Range:	N/A

Hantavirus Antibodies – Serum See also under viral haemorrhagic fever under Travel

Laboratory:	Virology: - Referred to HPA, Special Pathogens Reference Unit, Wiltshire SP4 OJG
Specimen:	7.0 mL blood in plain gel tube
Comment:	Only available in very specific cases and following approval by a Consultant Microbiologist
Turnaround:	1-3 weeks
Report:	Positive / Negative

Haptoglobin

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	0.3-2.0 g/l

HCG, Total

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent requests: 1hour. Priority: 3 hours. Routine: same day
Ref. Range:	On report form

Helicobacter pylori Faecal Antigen Test

Laboratory:	Medical Microbiology
Specimen:	Faeces collected in a leak proof container.

Comment:	*H. pylori* is available for patients with dyspepsia aged less than 45 years **with NO "alarm symptoms"**. Stool samples should be submitted within 24 hours of collection, Monday to Friday. Specimens that are aged, where the date of collection is not stated or without relevant clinical details will not be processed.
Turnaround:	2 working days.
Report:	H. pylori 'antigen' detected/Not detected.

Heinz Bodies

Laboratory:	Haematology
Specimen:	3.0 mL K^3EDTA blood (1.0 mL Paediatric tubes are available).
Comment:	Prior authorization by Consultant Haematologist or SPR. Arrange with Haematology laboratory before taking specimen.
Turnaround:	2 days.
Ref. Range:	N/A

Hepatitis A IgM Antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Part of investigation of acute hepatitis for patients with amino alanine transferase (ALT) levels >300 IU/mL. Please provide clinical details. All detected specimens forwarded to NVRL for confirmation and/or genotyping.
Turnaround:	1 week
Report:	Detected / Not Detected

Hepatitis A IgG Antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in plain gel tube
Comment:	Used to determine immunity arising from naturally acquired infection or from vaccination for at risk groups. Testing is **not** recommended to confirm the effectiveness of vaccination.
Turnaround:	1 week
Report:	Detected / Not Detected

Hepatitis B Surface Antigen

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Used for diagnosis of acute or ongoing infection and determining carrier status. Should be used in conjunction with patient history and other hepatitis markers. New reactive samples are sent to the NVRL for confirmatory testing. **Do not test within 2 weeks of Hepatitis B vaccination dose as this interferes with assay interpretation.** Requests for testing post "Needlestick" injury should be notified to the laboratory in advance of sending the specimen, as these samples are processed urgently.
Turnaround:	2 working days
Report:	Detected / Not Detected.

Hepatitis B Antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Requests for testing post "Needlestick" injury should be notified to the laboratory in advance of sending the specimen.
Turnaround:	2 working days
Report:	Levels reported as mIU/ml with relevant comment regarding protective levels and advice on further vaccination

Hepatitis B Core Antibody (anti-HBc)

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	2 working days
Report:	Detected / Not Detected

Hepatitis B DNA / Viral Load (HBV genotyping)

Laboratory:	Virology
Specimen:	8ml K^2EDTA Greiner tube
Comment:	HBV viral load is important in the assessment of chronic infection to understand the risk of disease activity, onward transmission (particularly in pregnancy) and in monitoring response to therapy. It may also be needed in cases of "past resolved" Hepatitis B prior to receipt of immunosuppressant drugs to determine the risk of reactivation. HBV genotyping may influence the severity of liver disease, disease progression and clinical outcome. Only performed on request if detectable HBV viral load from Hepatology/ID clinics Specimen must be delivered to a Virology staff member within 24 hours of phlebotomy and before 4pm.
Turnaround:	10 days
Report:	Not detected/ Viral Load reported in IU/ml with comment where relevant

Hepatitis C Antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Used in the assessment of acute hepatitis and determining carrier/donor status. Antibodies take 6 weeks to 3 months (up to six months) to develop after exposure. Anti-HCV antibodies may be undetectable in some stages of the infection and in some clinical conditions (immunosuppression). Patients with acute hepatitis who initially test negative may need follow-up testing. This test should be used in conjunction with patient history and other hepatitis markers. Presence provides evidence of exposure to HCV, but does not provide evidence of current active infection. Newly reactive samples are referred to NVRL for confirmation and a further specimen for Hepatitis C RNA is requested. Requests for testing post "Needlestick" injury should be notified to the laboratory in advance of sending the specimen.
Turnaround:	2 working days. Samples referred for further testing 1-2 weeks.
Report:	Not detected, if negative. A provisional report will be issued on any sample giving reactive findings on initial testing. These specimens are referred to the NVRL for further testing and a final report.

Hepatitis C PCR / Viral Load / Genotype

Laboratory:	Virology. Hep C Genotype is performed in the NVRL.
Specimen:	8ml K^2EDTA Greiner tube. Two tubes if genotype is also required.
Comment:	Detectable HCV RNA in blood indicates viral replication and active Infection. Used to monitor response to treatment in known HCV patients. It is also available for needle stick injury recipients, 6 weeks post exposure. HCV genotyping is available on request by ID/Hepatology teams for patients with quantifiable levels of HCV RNA in their blood. Used to determine which patients are more likely to respond to anti-viral treatment and appropriate treatment duration. Newly diagnosed HCV patients with confirmed active infection are automatically sent to the reference laboratory for genotyping. Specimen must be delivered to a Virology staff member within 24 hours of phlebotomy and before 4pm. The Greiner tubes are available from Laboratory Stores (EXT 4377)
Turnaround:	10 days
Report:	Not detected/Viral Load reported in IU/ml with comment where relevant

Hepatitis D Antibody

Laboratory:	Virology: - referred to referred to the National Viral Reference Laboratory, Dublin
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Only sent if patient is Hepatitis B surface antigen positive. Dual infection is associated with more severe hepatitis and fibrosis. All patients newly diagnosed with Hepatitis B are referred to NVRL for screening for Hepatitis D co-infection.
Turnaround:	2-4 weeks
Report:	~~Positive/Negative~~ Detected/Not detected

Hepatitis E Antibody

Laboratory:	Virology: - referred to the National Viral Reference Laboratory, Dublin
Specimen:	7.0 mL blood in a plain gel tube

Comment:	Request must be approved by Consultant Microbiologist
Turnaround:	2 – 4 weeks
Report:	Positive/Negative

***HER-2* DDISH, Status Evaluation**	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology Laboratory, on Request from Consultant Pathologist only.
Comment;	Testing available on request by Pathologist.
Turnaround;	5 – 10 working days after request from Pathologist received
Report:	Integral part of Histopathology report issued by Division of Anatomic Pathology

Heriditary Spherocytosis Screen (Flow Cytometry)	
Laboratory:	Haematology: Referred to Crumlin Hospital
Specimen:	3.0 mL K^3EDTA blood, at room temperature.
Comment:	Requests for flow cytometry tests should only be received Monday –Thursday between 9am and 5pm unless prior arrangements have been made with Flow Cytometry. Samples must be received within 24hours. Full clinical information and reason for request must accompany specimen.
Turnaround:	4 weeks
Ref. Range:	Interpretation by Consultant Haematologist on report form.

Herpes simplex virus (HSV) antibody (Not suitable for acute diagnosis)	
Laboratory:	Virology: -Referred to HPA, Sexually Transmitted + Blood Borne Virus Laboratory, Colindale.
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Only referred to Reference Laboratory in exceptional circumstances and with prior approval of a Consultant Microbiologist. HSV specific serology is a typing assay that allows detection of type specific IgM and total antibody. **Do not request for acute diagnosis.** HSV type-specific antibodies may take 4 - 6 weeks to appear after initial infection
Turnaround:	1 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected

Herpes simplex virus (HSV) and Varicella-Zoster virus (VZV) - PCR	
Laboratory:	Virology – referred to National Virus Reference Laboratory, Dublin
Specimen:	Lesion swab in viral transport medium.
Turnaround:	1 week
Report:	HSV 1: Detected/ Not Detected ; HSV 2 Detected/ Not Detected; VZV Detected/ Not Detected;

5-HIAA (Serum)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Serum, ideally sample taken after overnight fast and important to counsel patient to avoid serotonin containing food prior to sampling (bananas/avocados/pineapple/kiwi/walnuts/tomatoes) and cough medicines)
Turnaround:	10 working days
Ref. Range:	On report form

5-HIAA (Urine)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	24 hour acidified urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 – 3 weeks
Interpretation:	As per returned report
Of note:	Patients should avoid the following foods and medications for at least 48 hours before and during the 24-hour urine collection: bananas, walnuts, pineapple, plantain, avocados, eggplant, tomatoes, plums, kiwi fruit, chlorophenylalanine, isocarboxazid, isoniazid, levodopa, methyldopa, monoamine oxidase inhibitors.

High Density Lipoprotein (HDL)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Ideally a patient should fast for 12 hours. However, if a patient in unable or unwilling to fast for 12 hours a specimen taken after a 9 hour fast is acceptable".
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
High Vaginal Swab (HVS)	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Only Endocervical swabs, Urethral swabs and IUDs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required.
Turnaround:	3 working days
Report:	Any significant pathogen and susceptibilities if appropriate.
Non-Indigenous Mycoses Serology: Endemic Dimorphic Fungi, e.g. Histoplasmosis, Coccidioidomycosis, Blastomycosis, Paracoccidioidomycosis	
Laboratory:	Virology: -referred to The Health protection Agency, Mycology Reference Laboratory Bristol BS2 8EL
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Endemic, deep or systemic mycoses are common in specific geographical areas of the world. Although the manifestations of endemic mycoses are well defined, their diagnosis cannot be solely based on clinical presentation, since symptoms overlap among them and other infectious diseases. Serology may aid in the diagnosis of non-indigenous mycoses in combination with clinical and epidemiological data. **Travel history is essential** and samples will not be referred without **prior discussion with consultant microbiologist**
Turnaround:	1 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected
Histology Tissue Specimen	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology Specimen: Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis
HIT (Heparin Induced Thrombocytopenia) testing	
Laboratory:	Referred to St James Hospital Coagulation Lab
Specimen:	7.0 mL blood in a plain gel tube.
Comment:	Arrange with Haematology team 4T Request form must be completed
Turnaround:	3 working days (Mon – Fri)
Ref. Range:	Refer to report
HLA B27 Typing	
Laboratory:	Immunology ; Referred to Eurofins Biomnis Dublin
Specimen:	EDTA blood (to be kept at room temperature only)
Comment:	Eurofins Biomnis Consent form for HLA testing to be submitted with samples for (available at www.eurofins.ie/biomnis/test-information/test-request-forms).
Turnaround:	3 weeks
Report:	Eurofins Biomnis report is issued by Immunology – refer to report for interpretation
HLA Typing	
Laboratory:	Immunology- Referred to Eurofins Biomnis Dublin
Specimen:	EDTA blood (to be kept at room temperature only)
Comment:	Restricted test. Eurofins Biomnis Consent form for HLA testing to be submitted with samples for (available at www.eurofins.ie/biomnis/test-information/test-request-forms).
Turnaround:	3 weeks

Report:	Eurofins Biomnis report is issued by Immunology. Refer to report.

HMMA - Homovanillic acid - Urine

Laboratory:	Clinical Biochemistry - referred to external laboratory for analysis
Specimen:	24 h acidified urine preferred, alternatively 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	7 days
Interpretation:	As per returned report
Of note:	Patient should avoid paracetamol during the urine collection.

Homocysteine

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL EDTA Lithium Heparin blood placed on ice and walked over delivered to the laboratory within 60 minutes of collection. Specimens not placed on ice immediately may exhibit a 10 - 20% increase in homocysteine concentration. MMUH will also accept Sarstedt Monovette Hcy-Z tubes. With this sample type, ice is not required but samples must reach the laboratory within 8 hours of collection (or within 24h if refrigerated) for separation and freezing.
Turnaround:	1 week
Ref. Range:	On report form

Human Immunodeficiency Virus antigen/antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube.
Comment:	Simultaneous qualitative detection of HIV p24 antigen and antibodies to HIV-1 and/or HIV-2. Used in the diagnosis of established HIV infection; detecting primary HIV infection after exposure; screening for HIV infection in higher-risk populations/patients with indicator conditions; screening programmes (e.g. antenatal, haemodialysis). Detectable results approx 4 weeks after exposure to the virus in 95% of cases. Initial negatives may require re-testing. Newly reactive samples are sent to the NVRL for confirmation
Turnaround:	2 working days. Samples referred for further testing 1-2 weeks.
Report:	Not Detected, if negative. A Provisional report will be issued on any sample giving reactive findings on initial testing. These specimens are referred to the NVRL for further testing and a final report.

Human Immunodeficiency (HIV) PCR / Viral Load / Genotype (ONLY if HIV infection diagnosed)

Laboratory:	Virology
Specimen:	One 8 ml Greiner ^{K2}EDTA Vacuette tube for viral load testing. Two tubes if Genotype is also required.
Comment:	Specimen must be delivered to a Virology staff member within 24 hours of phlebotomy and received in laboratory before 4pm. Only samplescollected in 8 ml Greiner ~~these~~ tubes are suitable for processing. ~~The~~ Greiner tubes are available from Laboratory Stores (Ext 4377). ~~Samples must be received in the laboratory before 4pm.~~ This assay is suitable for the detection and quantification of HIV-1 RNA in human plasma from HIV-1 infected individuals to monitor response to treatment. This assay is NOT intended to be used as a screening test for HIV-1 or as a diagnostic test to confirm the presence of HIV-1 infection. Note that patients who have received CAR-T therapies may display positive results as a result of the presence of the LTR target within certain chimeric antigen receptor T-cell (CAR-T) products. Additional confirmatory testing should be performed in this situation. **Genotype:** HIV-1 genotypic resistance assay detects mutations in the reverse transcriptase and protease regions of the HIV-1 polymerase gene and provides a drug resistance profile. This test is only possible if there is a detectable viral load.
Turnaround:	10 days
Report:	Not Detected/copies/ml with comment where relevant.

Human T-Lymphocyte Virus (HTLV)

Laboratory:	Virology: -referred to National Viral Reference Laboratory, Dublin.

Specimen:	7.0 mL blood in a plain gel tube
Comment:	Only available in specific cases and following approval by the Microbiology Medical staff. HTLV-1 is the causative agent of a form of blood cancer (adult T-cell leukaemia or lymphoma, ATL) and of a progressive disease of the nervous system (HTLV-1 associated myelopathy or tropical spastic paraparesis). HTLV serology is to determine whether someone is infected with HTLV, following potential contact with the virus, or as part of an investigation into the cause of lymphoma or neurological disorders. Note that clinical details including travel history and risk factors need to be included prior to referral for testing.
Turnaround:	2 – 4 weeks
Report:	Reported in IU/ml

Huntington's Disease

Laboratory:	Immunology: – referred to Department of Clinical Genetics, CHI, Crumlin, Dublin.
Specimen:	Blood in EDTA tube
Comment:	It is mandatory for all requests to be accompanied by a fully completed CHI Genetic request form. It is critical the informed consent section is completed. Testing will not be carried out if forms are not completed fully. CHI request forms can be download from https://www.childrenshealthireland.ie
Turnaround:	Up to 12 weeks
Ref range:	Refer to report- including interpretative comment

Hurler's Syndrome Screen

See "Alpha-1-iduronidase"

Hydatid antibodies– See Echinococcus serology

~~Laboratory:~~	~~Virology: -referred to the Hospital for Tropical Diseases, London WCIE 6AU~~
~~Specimen:~~	~~7.0 mL blood in a plain gel tube~~
~~Comment:~~	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~
~~Turnaround:~~	~~2 – 3 weeks~~
~~Report:~~	~~Positive/Negative~~

Hydatid Cyst

Laboratory:	Medical Microbiology
Specimen:	Fluid from liver to sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	2 working days
Report:	Presence or absence of *Echinococcus* sp.

17-Hydroxyprogesterone (infants)> and <1year old

Referred to external laboratory for analysis. See "17-Alpha-OH-Progesterone, < 1 year old »

Immunoglobulins IgG / IgA / IgM and Serum Protein Electrophoresis

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	5 working days
Ref. Range:	Immunoglobulin Levels:

Age	IgG g/L	IgA g/L	IgM g/L
15 years - Adult	7 -16	0.7 -4	0.4 -2.3

For Age-related Paediatric Ranges see report
Electrophoresis / Immunofixation: Report with interpretative comment.
Note: electrophoresis results reported for patients > 30 years

IgD

Laboratory:	Immunology: – referred to Immunology dept, Northern General hospital, Sheffield
Specimen:	5 mL blood in plain gel tube
Turnaround:	6 weeks
Ref. Range:	Refer to report

IgE (Total)

Laboratory:	Immunology	
Specimen:	5.0 mL blood in plain gel tube	
Turnaround:	7 working days	
Ref. Range:	Age	IgE kU/L
	11yrs - adult	4 -100
	For Age-related Paediatric Ranges see report	

IgG Subclasses (IgG1, IgG2, IgG3)

Laboratory:	Immunology		
Specimen:	5.0 mL blood in plain gel tube		
Turnaround:	7 working days		
Ref. Range:	IgG1 g/L	IgG2 g/L	IgG3 g/L
Adult	3.2-10.2	1.2-6.6	0.2 -1.9
	For Age-related Paediatric Ranges see report		

IgG Subclasses (IgG4)

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Ref. Range:	Adult: 0-1.29g/L For Age-related Paediatric Ranges see report

IL28B genotyping

Laboratory:	Immunology; referred to National Virus Reference Laboratory, UCD.
Specimen:	8.0 mL EDTA blood
Turnaround:	4 weeks
Ref. Range:	Refer to report- including interpretative comment

Immunofluorescence Biopsies - Renal

Laboratory:	Please notify the Histopathology Department (ext. 4589) at least 24 hours in advance.
Specimen:	Place the biopsy in normal saline to maintain hydration and deliver to the laboratory immediately. Include contact details on request form.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Immunofluorescence Biopsies - Skin

Laboratory:	Please notify the Histopathology Department (ext. 4589) at least 24 hours in advance.
Specimen:	Deliver to the laboratory immediately. Include contact details on request form.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Immunophenotyping (Flow Cytometry)

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood or Bone Marrow aspirate in EDTA or Lymph Node Biopsy in RPMI
Comment:	Requests for flow cytometry tests should only be received Monday –Thursday between 9am and 5pm unless prior arrangements have been made with Flow Cytometry. Prior arrangement with Consultant Haematologist or SPR.
Turnaround:	2 – 5 days
Report:	Contact Consultant Haematologist

Infliximab (trough levels)

Laboratory:	Immunology	
Specimen:	5.0 mL blood in a plain gel tube	
Turnaround:	5 working days	
Interpretation:	Induction (week 2)	≥20µg/ml
	Induction (week 6)	≥10µg/ml
	Post induction (week 14)	≥3µg/ml
	Maintenance	≥3µg/ml
Comment:	Antibodies to Infliximab will be reflex tested if necessary. Negative = <10ng/mL	

Influenza A virus– See Respiratory Virus PCR

~~Laboratory:~~	~~Virology~~

~~Specimen: Combined nasal/throat swab in viral transport medium.~~
~~Turnaround: 2-3 working days~~
~~Report: Detected/Not Detected~~

Influenza B virus– See Respiratory Virus PCR

~~Laboratory: Virology~~
~~Specimen: Combined nasal/ throat swab in viral transport medium.~~
~~Turnaround: 2 - 3 working days~~
~~Report: Detected/Not Detected~~

INR (International Normalised Ratio)

Laboratory: Haematology
Specimen: 2.7 mL blood in a 0.109m Sodium Citrate tube. (1.0 mL Paediatric tubes are available).
Comment: Fill bottle to mark. Details of anticoagulant therapy required. Do not refrigerate specimens for INR. INR is used to monitor Warfarin therapy.
Turnaround: 1 day
Ref. Range: See report form

Insulin

Laboratory: Clinical Biochemistry
Specimen: 7.0mL fasting blood in a plain gel tube delivered immediately to the laboratory
Turnaround: 1 week
Ref. Range: On report form

Insulin Like Growth Factor 1

Laboratory: Clinical Biochemistry.
Specimen: 7.0 mL fasting blood in a plain gel tube, delivered to laboratory same day
Turnaround: 3 weeks
Ref. Range: See report form

Interferon Gamma Release Assay

See: "Quantiferon"

Intraocular Fluids / Corneal Scrapings

Laboratory: Medical Microbiology
Specimen: Pre-inoculated media. If sufficient fluid use sterile container.
Comment: Contact Laboratory to collect fresh culture plates and slide for corneal scrapings. Deliver to Laboratory immediately.
Turnaround: 3 days
Report: Clinically significant isolate with the appropriate sensitive

Intra – Uterine Contraceptive Device (IUCD)

Laboratory: Medical Microbiology
Specimen: Intra Uterine Device. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment: Only submit for culture with relevant clinical details. Only Endocervical swabs, Urethral swabs and IUDs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required.
Turnaround: 3 working days
Report: Clinically significant isolate with the appropriate sensitivities

Intravascular Cannulae - Culture

Laboratory: Medical Microbiology
Specimen: Cut 4cm of line to sterile container. Delay > 2 h refrigerate @ 2-8^{O}C. (Tips >4cm will be rejected).
Comment: Only submit specimen for culture where indications of infection are present.
Turnaround: 3 working days
Report: Clinically significant isolate with the appropriate sensitivities.

Iron

Laboratory: Clinical Biochemistry
Specimen: Fasting sample required. 7.0 mL blood in a plain gel tube
Turnaround: Urgent: 2 hours. Priority: 3hours. Routine: 4 working days

Ref. Range:	On report form

Iron Stain (Perla Prussian Blue – Cytochemical Stain)

Laboratory:	Haematology
Specimen:	Bone marrow spread on a glass slide
Comment:	As for Bone Marrow testing
Turnaround:	2 weeks
Ref. Range:	N/A

JC (Polyoma) Virus

Laboratory:	Virology – referred to NVRL
Specimen:	Specimen type depends on clinical features e.g.Cerebrospinal fluid (CSF) only if paired with serum sample; Clotted blood; EDTA Whole Blood; Tissue; Urine
Comment:	JC virus is the etiologic agent of progressive multifocal leukoencephalopathy (PML) which is mainly seen in patients who are immune-deficient for long periods. JC virus also causes nephropathy in the renal transplant setting, although less frequently than BK virus. JC virus should be considered in an immunocompromised patient with progressively deteriorating CNS function.
Turnaround:	2 weeks
Report:	Detected/Not detected

JAK 2 Mutation

Please refer to MPN Panel

JAK -2 Exon 12

Please refer to MPN Panel

Joint Aspirates - Culture

Laboratory:	Medical Microbiology
Specimen:	Fresh specimen in Sterile Universal Container
Comment:	delay of >2 hrs refrigerate at 2-8C
Turnaround:	3 days
Report:	Any significant pathogen and sensitivities, if required.

Joint Aspirates – Uric Acid Crystals

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	5-10 mls fresh specimen in a universal container. Do not use fixative. Specify if cytology or crystal analysis is required. Please do not inject any material into joint before obtaining joint fluid sample. Submit sample to laboratory ASAP. Refrigerate overnight if necessary. Please use powder free gloves to avoid contamination of sample by powder.
Comment:	Indicate clinical history on test requisition and reason for test.
Turnaround:	80% by 5 working days
Report:	Detection of inflammatory conditions Joint Fluid
Laboratory:	Medical Microbiology
Specimen:	Specimen in sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Clinically significant isolate with the appropriate sensitivities

Joint Fluid – Uric Acid Crystals

Please refer to Joint Aspirates

Karyotyping

See Cytogenetics

Ketones – Beta-hydroxybutrate, Acetoacetate and Pyruvate

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form

Kleihauer Test for Foetal Cells

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood - fresh.

Comment:	Limited service available. This test is not available in UCHG for Rh determination. Request form must contain relevant clinical details.
Turnaround:	1 day (Mon – Fri) – not available on weekends.
Ref. Range:	N/A

KRAS Mutation analysis	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology Laboratory, Request from Arrange via consultant pathologist.
Comment;	Testing available on request from consultant Pathologist.
Referrals	Contact the Department of Histopathology, Cytopathology and Molecular pathology on 4078
Turnaround;	5 – 10 working days after request from Pathologist received
Report:	Integral part of Histopathology report issued by Division of Anatomic Pathology

Lactate	
Laboratory:	Clinical Biochemistry: -also available on Blood Gas analysers located in A/E, ICUs, HDU, NICU, AMAU, Labour ward, theatre and SCU.
Specimen:	Blood in a balanced heparin syringe delivered to laboratory within 15 minutes of collection.
Comment:	Advisable to contact lab in advance of taking specimen
Turnaround:	15 minutes
Ref. Range:	On report form

Lactate Dehydrogenase (LDH)	
Laboratory:	Clinical Biochemistry. PLEASE NOTE: LDH concentration can be increased significantly due to disruption of the red cell membranes when specimens are sent through the pneumatic chute (pod) system. It is recommended that where possible in-house samples requesting LDH should be delivered to the laboratory by hand.
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hr. Priority: 3 hrs. Routine: same day.
Ref. Range:	On report form Lead
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	7.0 mL blood in a Na^+. EDTA trace element tube.
Turnaround:	1 month
Ref. Range:	On report form

Lead	
Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis
Specimen:	7.0 mL blood in a Na^+. EDTA trace element tube.
Turnaround:	1 month
Ref. Range:	On report form

Legionella culture	
Laboratory:	Medical Microbiology
Specimen:	Sputum or BAL in 60 mL sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Routinely on ICU BAL specimens, and sputum on request. Non-ICU specimens are on request following approval by a Consultant Microbiologist. Atypical pneumonia.
Turnaround:	10 days
Report:	*Legionella* sp isolated/Not isolated.

Legionella pneumophila Urinary Antigen (LUA)	
Laboratory:	Virology
Specimen:	Plain random urine specimen in a sterile Universal container
Comment:	Specimen to arrive in laboratory within 24 hours of collection. Refrigerate if delay in sending specimen to laboratory. Provide clinical details including symptoms and travel history. Note that this assay only detects *L. pneumophila* serogroup 1; Other serogroups or *Legionella spp* may be relevant and warrant further investigations including respiratory culture and/or PCR testing.
Turnaround:	1 working day

Report:	Detected / Not Detected

Leishmania antibody	
Laboratory:	Virology: - referred to The Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Only available in very specific cases and following approval by a Consultant Microbiologist
Turnaround:	2 – 3 weeks
Report:	Positive/Negative

Leptospira antibody (Leptospirosis; Weil's disease)	
Laboratory:	Virology: referred to National Virus Reference Laboratory. Reactive samples are referred to Porton Down for confirmation. If the patient presents in the first week of the disease, also send EDTA blood for Leptospirosis PCR.
Specimen:	7.0 mL blood in a plain gel tube. 2 samples taken 7 days apart – If initial sample IgM detected, will be used to confirm serotype; If initial sample IgM Not detected, will be retested. Note that cross-reactivity can occur resulting in false positives.
Comment:	Infection in humans may follow direct or indirect exposure to an infected animal's urine or contaminated fresh water. Incubation period: 7-21 days. Symptomatic infection presents with abrupt onset fever, myalgia, headache and vomiting; Second phase of abdominal pain, diarrhoea, rash, jaundice and can be complicated by renal/other organ dysfunction.A **comprehensive occupational, leisure and travel history with dates is required.**
Turnaround:	2-3 weeks.
Report:	~~Positive/Negative~~ Detected/Not detected

Leucocyte Alkaline Phosphatase (LAP) Cytochemical Stain	
Laboratory:	Haematology
Specimen:	6.0 mL Li Heparin blood
Comment:	Prior authorization by Haematology SPR.
Turnaround:	2 days
Ref. Range:	Refer to report

Leucocyte Mixed-Esterase Stain (Cytochemical Stain)	
Laboratory:	Haematology
Specimen:	Bone marrow slides
Comment:	Prior authorization by Haematology SPR.
Turnaround:	2 days
Ref. Range:	N/A

Leucocyte Esterase Stain (Cytochemical Stain)	
Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood
Comment:	Prior authorization by Haematology SPR.
Turnaround:	2 days
Ref. Range:	N/A

Leucodystrophy Screen: Very Long Chain Fatty Acids	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	3.0 mL K^+ EDTA blood
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

LH	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1working day. Routine: 2 working days
Ref. Range:	On report form

Lipoprotein (a)	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis

Specimen:	7.0mL blood in a plain gel tube
Comment:	Not routinely available, contact clinical team to discuss.
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Lithium

Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Comment:	Sample 12 hours post dose
Turnaround:	Urgent: 1hour. All other requests: 3hours
Therapeutic Range:	On report form

Liver core biopsy- (Hep C, Primary tumour or metastases)

Laboratory:	Histopathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions.
Report:	Histological diagnosis

Lletz

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions.
Report:	Histological diagnosis

Low Density Lipoprotein (LDL)

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Calculated parameter
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form

Lupus Anticoagulant Screen

Laboratory:	Haematology
Specimen:	2 x 2.7 mL blood in 0.109m Sodium Citrate tubes
Comment:	Details of anticoagulant therapy required. Must fill bottle to mark. Samples must submitted within 6 hours of draw.
Turnaround:	5 Weeks.
Ref. Range:	Qualitative Positive/Negative

Lyme Disease Antibodies

See “Borrelia burgdorferi”

Lymph Nodes for Query Lymphoma

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Fresh Tissue. Submit specimen intact to laboratory UNFIXED
Comment:	To be confirmed with Consultant Histopathologist at least 24 hours in advance. Immediately Dispatch to the lab.
Report:	Histological diagnosis.

Lymphocyte subsets CD3 (T cell) CD4 (T helper) CD8 (T cytotoxic) CD19 (B cell) CD16/56 (NK cell)

Laboratory:	Immunology
Specimen:	3.0 mL blood in EDTA bottle. **NOTE:** Sample MUST be kept at Room Temperature. Do not refrigerate.
Comment:	Record time and date of collection on form. Samples must be kept at room temperature, deliver to Immunology within 72 hours.
Turnaround:	3 working days
Ref. Range:	Refer to report

Lymphogranuloma venereum ~~antibodies~~ (LGV)

Laboratory:	Virology: -referred to the Health Protection Agency, ~~South West Lab.~~ Bristol ~~BS" 8EL~~
Specimen:	~~7.0 mL blood in a plain gel tube~~ Rectal swab – if CT detected by NAAT, automatically referred for testing

Comment:	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~ LGV is a STI caused by a particular strain of *C. trachomatis* (CT). It is mostly acquired by men who have sex with men. All people with proctitis should have rectal swabs tested for CT.
Turnaround:	2 – 4 weeks
Report:	~~Positive/Negative~~ Detected/ Not detected

Lysosomal Enzymes (Plasma and White Cell Enzyme Screen)	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	5.0 mL blood in EDTA tube.
Comment:	Contact laboratory prior to specimen collection. Monday and Tuesday am only
Turnaround:	1 – 3 weeks
Ref. Range:	See report form
Magnesium	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 2 hours. Priority: 3hours. Routine: 4 working days
Ref. Range:	On report form
Magnesium (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24 h collection
Turnaround:	1 working day
Ref. Range:	On report form
Malaria Screen	
Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood. Fresh sample required.
Comment:	Blood film is examined microscopically. The blood is tested for the presence of parasite associated enzyme. Positive specimen forwarded to Microbiology Laboratory. Travel history and clinical details essential. When submitting malarial requests please alert the Laboratory.
Turnaround:	1 day (Mon – Fri). Results of this test done out of hours or on weekends are confirmed by second scientist as soon as possible on the next working day.
Report:	Positive / Negative. Where clinically indicated a negative specimen may be referred to a reference centre for analysis by PCR.
Malignancy	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology Specimen: Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis
Manganese	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL in a trace element EDTA tube.
Turnaround:	3 – 4 weeks
Ref. Range:	See report form
Measles IgG antibody	
Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	**Post-vaccine testing is NOT routinely recommended.** Measles serology is performed as part of an occupational screen where MMR vaccination status is uncertain. It may also be used to assess the susceptibility of contacts of suspected or proven cases of measles. Please state **date of contact with measles if this is an investigation of rash in pregnancy**
Turnaround:	1 – 2 weeks
Report:	Detected / Not Detected
Measles IgM antibody and/or RNA	

Laboratory:	Virology: - referred to National Virus Reference Laboratory
Specimen:	Oral fluid PCR (Orocol swab): PCR 1st 5 days after rash onset; IgM days 5-7 after rash onset. 7.0 mL blood in a plain gel tube
Comment:	For suspected case of measles send Saliva (oral fluid/Orocol) testing kit. Testing acute and convalescent phase paired sera for the presence of IgM and IgG should only be used to support the diagnosis of recent infection.
Turnaround:	2-3 weeks.
Report:	Detected / Not Detected

Meningococcal C vaccine antibodies - Serum

Laboratory:	Immunology: – referred to Immunology Dept, Meningococcal Reference Unit, Manchester Medical Microbiology Partnership
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Ref range:	Refer to report

Meningococcal PCR

Laboratory:	Medical Microbiology: – Referred to the Irish Meningococcal and Sepsis Reference Laboratory
Specimen:	EDTA blood
Turnaround:	1 – 5 working days
Report:	Target Detected/Not detected

Mercury - Urine

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	24 h urine collection
Turnaround:	1 – 3 weeks
Ref. Range:	See report form

Metabolic Screen (Amino Acid Chromatography)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Li Heparin or clotted blood specimen
Comment:	Full clinical details must accompany request
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Metabolic Screen (Urine Amino Acid Chromatography)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Plain random urine specimen
Comment:	Full clinical details must accompany request
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Metanephrines query paraganglioma/phaeochromocytoma - Plasma (Metanephrine/ Normetanephrine/ 3-methoxytyramine)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	2 x 3.0 mL EDTA plasma must reach the laboratory within 15 minutes for immediate processing. Ideally, this sample is received on ice. Patient should ideally be fasted for at least 10 hours prior to testing. The patient should be cannulated and instructed to rest in a supine position for 30 minutes before sample collection. Please state on request form if patient is fasting and whether it is seated/supine sampling.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	2 weeks
Interpretation:	As per returned report
Of note:	Tricyclic antidepressants, selective serotonin reuptake inhibitors, serotonin and noradrenaline reuptake inhibitors, a and b adrenergic receptor blockers, calcium channel blockers, monoamine oxidase inhibitors, Levo(L)-Dopa, methyldopa and several stimulant/sympathomimetic drugs can increase catecholamine and metabolite concentrations. Ideally, patients should discontinue all medications that affect testing prior

	to sampling. In practice it is not always possible to discontinue medication before testing and it might be better to repeat testing, off medications, only when initial tests are elevated.

Metanephrines query paraganglioma/phaeochromocytoma - Urine (Metanephrine/ Normetanephrine/ 3-methoxytyramine)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Adults, 24 hour acidified urine collection Paediatrics, spot urine sent to the lab immediately as acidified on receipt
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	2 weeks
Interpretation:	As per returned report
Of note:	Tricyclic antidepressants, selective serotonin reuptake inhibitors, serotonin and noradrenaline reuptake inhibitors, a and b adrenergic receptor blockers, calcium channel blockers, monoamine oxidase inhibitors, Levo(L)-Dopa, methyldopa and several stimulant/sympathomimetic drugs can increase catecholamine and metabolite concentrations. Ideally, patients should discontinue all medications that affect testing prior to sampling. In practice it is not always possible to discontinue medication before testing and it might be better to repeat testing, off medications, only when initial tests are elevated.

Methadone

See "Urine Drugs of Abuse Screen"

Methaemoglobin

Laboratory:	Haematology
Specimen:	3.0mL in a Lithium Heparin Syringe Delivery during the hours of 9.30 a.m. to 12.30 and 2 p.m. to 5 p.m. Monday to Friday. Immediate delivery to the laboratory for testing within the one hour requirement.
Comment:	Clinical Details are essential.
Turnaround:	2 days
Ref. Range:	Refer to report

Methicillin-Resistant Staph aureus (MRSA)

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Restricted to specific groups of hospitalized patients. Pre-op screens from GPs. Other Non-hospitalized patients are screened by prior arrangement with a Consultant Microbiologist.
Turnaround:	4 working days.
Report:	MRSA isolated/Not isolated.

Methotrexate (Maxtrex)

Laboratory:	Clinical Biochemistry
Specimen:	5.0mL blood in a non-gel tube
Comment:	State date/time of sample collection clearly on request form. Measured on patients on high-dose Methotrexate. Contact Lab in advance and state time of infusion on request form.
Turnaround:	1 – 2 hours
Ref. Range:	Guidance on report form

Methylmalonic Acid (Serum)

Laboratory:	Haematology: - referred to external laboratory for analysis
Specimen:	5.0 mL blood in a plain gel tube. Specimen to be received within 24hrs of phlebotomy.
Turnaround:	5 weeks
Ref. Range:	On report form

Methylmalonic Acid (Urine)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Plain random urine specimen
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Microalbumin / Creatinine Ratio

See 'Albumin (Urine) / Microalbumin'

Microarray/aCGH

See Cytogenetics: Microarray/aCGH

Micropolyspora faenii (Farmer's Lung)

See: "Farmer's Lung antibodies"

Molecular Genetics

See to section 11.12 Guidelines relating to genetic referrals

Morphine (Opiates)

See "Urine Drugs of Abuse Screen"

Morphology

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood or Blood film
Comment:	Blood films are made, examined and reported on patients FBC results which satisfy the criteria laid down by the laboratory in the guidelines 'Indications for blood film examination'. When a blood film is specifically requested which falls outside of these guidelines this will be examined where the request form provides clinical details.
Turnaround:	Where clinical details are supplied urgent requests receive immediate attention. Routine differentials are reported within 1 day. Routine Morphologies reported within 4 days.
Report:	See report form

Mouth Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days
Report:	Presence of pathogens/ No Pathogens isolated.

MPL

See MPN Panel

MPN Panel (includes Jak2, CAL-R, Jak2 Exon 12, MPL)

Laboratory:	Haematology: - referred to CMD Laboratory, St James Hospital, Dublin 8
Specimen:	3 x 3.0 mL K^3 EDTA blood
Comment:	Test available Monday –Thursday only .CMD request form required. Prior approval by consultant Haematologist or registrar.
Turnaround:	120 days
Ref. Range:	N/A

MRD-CLL (Minimum Residual Disease detection of Chronic Lymphocytic Leukaemia)

Laboratory:	Haematology
Specimen:	3.0ml K^3EDTA
Comment:	Samples must be received within 24 hours. Full clinical information and reason for request must accompany specimen.
Turnaround:	3 -5 working days.
Report:	Interpretation by Consultant Haematologist on report form.

MRSA (Methicillin-Resistant Staph aureus)

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Restricted to specific groups of hospitalized patients. Pre-op screens from GPs. Other Non-hospitalized patients are screened by prior arrangement with a Consultant Microbiologist.
Turnaround:	3 working days.
Report:	MRSA isolated/Not isolated.

MSU – Midstream Urine

Laboratory:	Medical Microbiology
Specimen:	Specimen in urine vacuette tube. Specimen of Urine in Urine vacuum tube container.
Comment:	Urine taken at mid-point of urination. Delay >2 h refrigerate @ 2-8^{O}C
Turnaround:	Microscopy: 4 hrs for Urines received 8am to 12 midnight. Paeds Urines only processed post-midnight.

	Culture: 3 working days. MSU culture is only routinely performed on samples from children <16 yrs, maternity patients, clinical details specifying patient is neutropenic, immunocomprised and patients with a microscopy result with a white cell count >20/cmm. However culture may be requested in certain circumstances following discussion with a Consultant Microbiologist.
Report:	Microscopy: Cell count. Culture: Presence of significant pathogen and sensitivities if relevant.
Mumps IgG antibody	
Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	The clinical interpretation of mumps serology post-vaccine can be challenging. Detectable mumps IgG at a single time-point is not considered sufficient evidence for immunity. If documentation of 2 doses of MMR vaccine is not available, vaccination with two doses of MMR vaccine at least four weeks apart is recommended (NIAC). There is no indication for post- vaccine antibody testing. Mumps serology may be performed as part of an occupational screen or used to assess the susceptibility of contacts of suspected or proven cases of mumps.
Turnaround:	1-2 weeks
Report:	Detected/Not Detected/Equivocal
Mumps IgM antibody and/or RNA	
Laboratory:	Virology: Referred to NVRL
Specimen:	Oral fluid/Orocol swab; 7.0 mL blood in a plain gel tube
Comment:	For suspected case of mumps send Saliva (oral fluid/Orocol) testing kit. Testing acute and convalescent phase paired sera for the presence of IgM and IgG should only be used to support the diagnosis of recent infection.
Turnaround:	1 -2 weeks.
Report:	Detected/ Not Detected
Muscle Biopsies	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Fresh tissue
Comment:	Immediate dispatch to laboratory where tissue pieces are frozen / formalin fixed. Fresh tissue samples to be confirmed with the Consultant Pathologist (on frozens) at least 24 hours in advance.
Report:	Histological diagnosis
Mycobacteria Microscopy and Culture	
Laboratory:	Medical Microbiology
Specimen:	Specimen of sputa, BAL in sterile 60 mL container. Early morning urine in 100 mL sterile container by prior arrangement only. Fluids / tissues in sterile containers. Blood Culture / Bone Marrow aspirate, heavily blood stained fluids in Bactec Myco/Lytic (red cap) vials. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Culture is performed on all tissue and fluid samples where clinical details query MOTT. Decontaminated respiratory specimens are retained for 7 weeks. They are unsuitable for other investigations once decontaminated. The mycobacteria culture system is not validated for processing urine specimens.
Turnaround:	Microscopy: 1 working day. Culture: 6 to 7 weeks
Report:	Microscopy: Presence or absence of AAFB. Culture: *Mycobacteria* sp isolated/Not isolated & sensitivities if relevant.
Mycobacteria PCR - Xpert assay	
Laboratory:	Medical Microbiology
Specimen:	Specimen of sputa, BAL in sterile 60 mL container. Fluids/Fine Needle Aspirates/ Lymph Nodes in sterile containers. Minimum volume for CSF is 600µl.
Comment:	Xperts are performed on all samples requesting TB. Culture is only performed on all tissue and fluid samples or where clinical details query MOTT or NTM. Grossly blood stained samples are not suitable for GeneXpert.
Turnaround:	1-2 working days (Verbal report available on positive samples)

Report:	MTB Complex DNA Detected/Not Detected.

Mycology

Laboratory:	Medical Microbiology
Specimen:	Transport swab. Tissue / pus in sterile container. Hair, nail clippings, skin scrapings in Dermapak. Refer to Medical Microbiology section.
Comment:	Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	5 to 6 weeks
Report:	Microscopy: presence or absence of fungal elements Culture: Fungi Isolated/Not Isolated.

Mycoplasma genitalium PCR

Laboratory:	Virology, referred to NVRL
Specimen:	Abbott Multicollect swab or urine (first void in an Abbott Multicollect), preferably delivered to the laboratory within 24 h of collection.
Comment:	*M. genitalium* is a significant cause of non-gonococcal urethritis (NGU), including recurrent or persistent NGU. Consideration should be given to testing for *M. genitalium* in all males with non-GC urethritis and all individuals with signs or symptoms of PID, cervicitis, endometritis, associated infertility, ano-rectal conditions or epididymo-orchitis ~~Available only in very specific cases and following prior arrangement with a Consultant Microbiologist~~
Turnaround:	~~10 working days~~ 2-3 weeks
Report:	Not detected~~, if negative~~. A provisional report will be issued on any sample giving presumptive detected findings on initial testing. These specimens are referred to Colindale for further testing and a final report.

Mycoplasma pneumoniae ~~antibody~~ serology/PCR

Laboratory:	Virology: -Referred to National Virus Reference Laboratory, Dublin
Specimen:	7.0 mL blood in a plain gel tube. Respiratory sample (e.g. BAL, NPA, NPS)
Comment:	Available only in very specific cases and following prior arrangement with a Consultant Microbiologist. In early infection a weakly reactive or equivocal IgM result may require a follow up sample in 7-10 days to demonstrate a rise in IgM titres and/or seroconversion of IgG to confirm the diagnosis. Please provide clinical details and timeline.
Turnaround:	2-3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected

Mpox (monkey pox or MPVX)

Specimen:	One standard viral swab in viral transport medium
Comment:	The swab should be from a cutaneous lesion either ulcer or vesicular fluid if present. If there are concerns that patient is presenting during the prodromal stage and there are no cutaneous lesions, a throat swab may be taken instead. A negative result for the throat swab does not rule out MPXV and clinical correlation is advised and a follow up swab sample is required if lesions develop.
Turnaround:	Daily testing Mon – Fri at NVRL
Report:	Detected/Not detected

Myositis Specific and Associated Antibodies Screen

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	7 working days
Report:	Positive/Negative Please refer to the table on Page 55 & 56 for details (Antibodies detected on the Myosistis screen denoted by *).

Neoplasm

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions

Report:	Histological diagnosis

Neutrophil Function Test – Dihydrorhodamine Flow Cytometry Assay of Respiratory Burst Activity

Laboratory:	Immunology
Specimen:	5 mL blood in EDTA must be kept at room temperature. Do not refrigerate. Control sample must also be taken. Samples must be delivered to lab within 24 hours.
Comment:	Testing must be first discussed with immunology medical/scientific staff
Turnaround:	2 days
Report:	Normal/Abnormal

N. meningitidis PCR

See "Meningococcal PCR"

Neisseria gonorrhoeae PCR (see also CT/TV)

Laboratory:	Virology
Specimen:	Abbott Multicollect swab or urine (first void in an Abbott Multicollect), delivered to the laboratory within 24 h of collection.
Comment:	If delay refrigerate @ 2-8^{O}C.
Turnaround:	10 working days
Report:	Detected / Not Detected

Noradrenaline PAEDIATRICS query neuroblastoma - urine

Laboratory:	Clinical Biochemistry, referred to external laboratory for analysis
Specimen:	Paediatrics <12 years, only for query neuroblastoma, 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	12 working days
Interpretation:	As per returned report

Noradrenaline - plasma

Laboratory:	Clinical Biochemistry, referred to external laboratory for analysis
Specimen:	Lithium Heparin Plasma, must be brought to the lab immediately for processing (within 1 hour)
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	10 working days
Interpretation:	As per returned report

Norovirus detection

Laboratory:	Medical Microbiology
Specimen:	Faeces in spoon container. Delay < 24 h refrigerate @ 2-8^{O}C. Delay > 24 freeze @ -20^{O}C.
Comment:	Only processed by prior arrangement with microbiology consultant.
Turnaround:	1 working day
Report:	Norovirus antigen detected / not detected. Molecular: Norovirus Genotype 1 & 2 RNA Detected/Not detected

Nose Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Only processed for *S. aureus*.
Turnaround:	3 working days
Report:	Relevant pathogens

NRAS

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology laboratory, arrange via Consultant Pathologist
Comment:	Testing available on request by Pathologist
Referrals:	Contact the Department of Histopathology, Cytopathology and Molecular Pathology on 4078
Turnaround:	5-10 working days after request from Pathologist received

Report:	Integral part of Histopathology report issued by the Division of Anatomic Pathology, Department of Histopathology, Cytopathology and Molecular Pathology
NT-ProBNP	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form
Oestradiol	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form
Opiates	
See "Urine Drugs of Abuse Screen"	
Organic Acids	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Plain urine specimen
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Osmolality	
Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: same day. Routine: 4 working days. Please note if urgent analysis required, contact must be made with Clinical Biochemistry by phone, otherwise samples received will be treated as routine.
Ref. Range:	On report form
Osmolality (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	Plain random urine specimen
Turnaround:	Urgent: 1hour. Priority: same day. Routine: 2 working days. Please note if urgent analysis required, contact must be made with Clinical Biochemistry by phone, otherwise samples received will be treated as routine.
Ref. Range:	On report form
Osmotic Fragility	
Laboratory:	Haematology
Specimen:	5.0 mL Li fresh Heparin blood and a normal control specimen in 5.0 mL Li Heparin
Comment:	Authorisation by Haematology SPR and arrangement with laboratory. The specimen must reach the laboratory before 11:00 on day of analysis.
Turnaround:	2 days
Ref. Range:	See report form.
Ova / Cysts / Parasites	
Laboratory:	Medical Microbiology
Specimen:	Faeces in leak proof container. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Cryptosporidium and Giardia detection by molecular technique. Other ova and parasites are rarely detected in faeces. Examination for other O&P is only performed when specific additional parasite is specified on the request form, accompanied by relevant clinical information.
Turnaround:	3 days for Cryptosporidium and Giardia molecular detection. 1 week for parasite concentration.
Report:	Cryptosporidium / Giardia Detected / Not Detected. Ova, Cysts or Parasites Seen / Not seen.
Ovarian Cyst Fluid, Neoplastic/Non-Neoplastic Cells	
See Effusions/ FNA	
Oxalate (Urine)	

Laboratory:	Clinical Biochemistry: referred to external laboratory for analysis.
Specimen:	24 hr plain urine collection acidified by the lab on arrival. For paediatric patients, a spot urine acidified by the lab on arrival will be sufficient.
Turnaround:	Approximately 2 weeks.
Reference Interval:	On report if applicable.

Paracetamol

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. All other requests: 3hours.
Interpretation:	On report form

Paraneoplastic Antibodies

See "Autoantibodies: Anti-Neuronal Antibodies"

Paraquat - Urine

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Plain random urine specimen
Turnaround:	1 day if prior notification received
Ref. Range:	On report form

Parvovirus B19 IgM + IgG antibodies

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube. Available only in specific circumstances.
Comment:	Clinical details essential with date of exposure; date of symptoms e.g. rash, slapped cheek, as well as details of immunosuppression or pregnancy as repeat testing and/or PCR may be indicated. IgG alone used to determine the status of patients with sickle cell disease/other haemoglobinopathies.
Turnaround:	5 days
Report:	~~Positive/Negative~~ Detected/Not detected

~~**Parvovirus / B 19 IgM Antibodies**~~

~~See "Erythrovirus B19"~~

Pelvic Cavity Wash (Diaphragm, Gutter or Cul de sac Wash)

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology Specimen: Collect 10 - 20 mL fresh specimen into a twist top leak proof 20 mL or 50 mL universal sample bottle containing Shandon Cytospin Collection Fluid (green fixative solution). Refrigerate overnight if necessary.
Comment:	Indicate clinical history on test requisition and reason for test.
Turnaround:	80% in 5 working days
Report:	Detection of neoplastic and non-neoplastic cells

Penile Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C
Comment:	Treated as skin swab. For investigation for *Neisseria gonorrhoeae* a Urethral swab must be sent.
Turnaround:	3 working days
Report:	Any significant pathogen and susceptibilities if appropriate.

Pericardial Fluid – Pleural Fluid - Cytology

See "Effusions"

Pericardial Fluid / Peritoneal Fluid / Pleural Fluid

Laboratory:	Medical Microbiology
Specimen:	Specimen in sterile container (include clotted material). Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days

Report:	Growth / No Growth & sensitivities if required

Peritoneal Fluid - Cytology

See "Effusions"

Pernasal Swab / Pertussis

Laboratory:	Medical Microbiology – referred to Our Lady's Children's Hospital Crumlin [OLCHC]
Specimen:	Pernasal swab (available from Medical Microbiology). Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	10 days.
Report:	*Bordetella* sp isolated / not isolated

Phenylalanine

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	2.0 mL Li Heparin blood and a Gutherie card
Comment:	Request form MUST include clinical details
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Phenytoin (Epanutin)

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen immediately before next dose (trough specimen)
Turnaround:	Analysed during routine working hours
Therapeutic. Range:	On report form

Phosphate -inorganic

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

Phosphate (Urine)

Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection
Comment:	Used in conjunction with serum inorganic phosphate to calculate IPeGFR. Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

Phytanic Acid

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	3.0 mL EDTA blood
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Pippelle Biopsy

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology Specimen:
Specimen:	Submit specimen to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Pinworm

Laboratory:	Medical Microbiology
Specimen:	Apply sellotape to anal area at night or early morning, fix to slide, send to Laboratory. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	1 week
Report:	Ova seen/Not seen

Placenta

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Placentas from labour ward should be placed in adequate formalin fixative and placed in the large size container. Ensure both requisition form and container are labelled with specimen Placenta and with patient demographics. Clinical details should always include gestational age at time of delivery, in addition to other relevant clinical information. Health & Safety precautions
Report:	Histological diagnosis

Placenta

Laboratory:	Medical Microbiology
Specimen:	Fresh sample received in Cellular Pathology Sterile white specimen container
Turnaround:	3 working days
Report:	Any significant pathogen and sensitivities if required.

Placental Surface Swabs

Laboratory:	Medical Microbiology
Specimen:	Paired charcoal swabs taken from both Foetal and Maternal side of the Placenta
Turnaround:	3 working days
Report:	Any significant pathogen and sensitivities if required.

Plasma Viscosity

Laboratory:	Haematology
Specimen:	3 x 3.0 mL K^3 EDTA blood
Comment:	Must be received in laboratory within 2 hours of phlebotomy
Turnaround:	5 days
Ref. Range:	Refer to report

Platelet Aggregation Studies

Laboratory:	Haematology
Specimen:	6 x 2.7 mL blood specimens in 0.109m Sodium Citrate tubes. Please supply samples from a normal control in conjunction with the test specimens.
Comment:	Prior authorization by Consultant Haematologist or SPR. Arrange with Coagulation laboratory before taking specimen. Patient must not take any anti-platelet medications for 1 week prior to test (incl. aspirin, NSAIDA, Clopidogrel/plavix, cough suppressants). Discard the first specimen when obtaining blood from patient as there may be some platelet activation present which will influence the test results. Specimens must reach the Coagulation laboratory no later than 11:00 on the day of analysis. Must fill bottles to mark.
Turnaround:	Àssay performed on day of appointment
Ref. Range:	N/A

Pleural Fluid - Cytology

See “Effusions”

Pleural Fluid Microscopy & Culture

Laboratory:	Medical Microbiology
Specimen:	Pleural fluid in sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	Microscopy: 1 working day. Culture: 3 working days
Report:	Microscopy: Cell count, Differential and Gram stain
Culture:	Growth / No Growth & sensitivities if required

Pneumococcal PCR

Laboratory:	Medical Microbiology – referred to the Irish Meningococcal and Sepsis Reference Laboratory
Specimen:	EDTA blood
Comment:	Sample to be handed to Medical Microbiology staff member
Turnaround:	1 – 5 working days
Report:	Pneumococcal DNA: Detected / Not Detected

Pneumococcus IgG/ IgG2 antibodies

Laboratory:	Immunology

Specimen:	5.0mL blood in plain gel tube
Turnaround:	15 working days
Ref range:	Pneumococcus IgG: 11.0 - 320.8 mg/L Pneumococcus IgG2: 1.2 – 107.1 mg/L

Pneumocystis jiroveci investigation

Laboratory:	Sent to NVRL subject to Medical staff approval.
Specimen:	BAL or induced sputum only. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	2 weeks
Report:	Pneumocystis DNA detected/Not detected

PNH Screening (Paroxysmal Nocturnal Haemoglobinuria) by Flow Cytometry

Laboratory:	Haematology:
Specimen:	3.0 mL K3 EDTA blood
Comment:	Requests for flow cytometry tests should only be received Monday –Thursday between 9am and 5pm unless prior arrangements have been made with Flow Cytometry. Samples must be received within 24 hours. Full clinical information and reason for request must accompany specimen.
Turnaround:	3-5 working days
Ref Range:	Interpretation by Haematologist

POC – Products of Conception

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen to laboratory in 10% Neutral Buffered Formalin.
Comment:	See also Foetus. Health & Safety precautions
Report:	Histological diagnosis

Porphyrin Screen

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	10.0 mL EDTA blood, 10.0 mL Li Heparin blood, 5g fresh faeces and a spot urine collection
Comment:	All specimens must be protected from light. St. James's Hospital 'Porphyrin Request Form' must be completed and sent with sample, form available in GUH Useful Resources
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Post-Vasectomy Analysis

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Semen
Comment:	Available Monday to Friday 09:00 to 16:00 h. Refrigerate overnight if necessary. Indicate clinical history on test requisition. Include the collection time and date.
Report:	Histological diagnosis

Potassium

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL fresh blood in a plain gel tube
Comment:	GP specimens **MUST** be received in the laboratory within 3 hours of venesection or centrifuged.
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

Potassium (Urine)

Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

Pre-albumin

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	4.0 mL blood in a plain gel tube

Turnaround:	1 – 3 weeks
Ref. Range:	Male: 0.2 – 0.5 g/L Female: 0.1 – 0.4 g/L

Pregnancy Test

See "HCG Total"

Primidone/Mysoline

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen immediately before next dose (trough specimen)
Turnaround:	1 week
Therapeutic Range:	On report form

NT-ProBNP

See « NT-ProBNP »

Procollagen Peptide Type 3

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis,
Specimen:	5.0 mL blood in a plain tube, received in lab within 1hr
Comment:	Do not use a gel tube
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Progesterone

Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 4 working days
Interpretation:	On report form

Prograf

See "Tacrolimus"

Proinsulin

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	7.0mL blood in a plain gel tube, send to the laboratory immediately to allow separation and freezing within 30 minutes of venepuncture
Turnaround:	1 – 3 weeks
Comment	Hypoglycaemia, spontaneous or whilst fasting, must first be established (confirmed by laboratory analysis)
Ref. Range:	On report form

Prolactin

Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form

Prostatic Core Biopsy

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin. Ensure each container clearly indicates site and information matches details given on form.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Protein

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

Protein (Urine)

Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection

Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

Protein C

Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube
Comment:	Requests should be received in the laboratory within 2 hours of phlebotomy. Details of anticoagulant therapy required. Must fill bottle to mark.
Turnaround:	5 weeks
Ref. Range:	Refer to report

Protein S and Free Protein S

Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube
Comment:	Requests should be received in the laboratory within 2 hours of phlebotomy. Must fill bottle to mark. Details of anticoagulant therapy required.
Turnaround:	5 Weeks
Ref. Range:	Refer to report

Prothrombin Gene Mutation

Laboratory:	Haematology: - referred to NCHCD, SJH, Dublin
Specimen:	5.0 mL blood in EDTA tube
Comment:	Consent form for genetic analysis must accompany each request for this test. These are available in the 'thrombophilia genetic mutation requests' folder in the GUH Useful Resources folder on PC Desktop or by contacting the Haematology Lab prior approval by consultant Haematologist or registrar.
Turnaround:	4 weeks
Ref range:	N/A

Prothrombin Time (PT)

Laboratory:	Haematology
Specimen:	2.7 mL blood in a 0.109m Sodium Citrate tube. (1.0 mL Paediatric tubes are available).
Comment:	Details of anticoagulant therapy required. Do not refrigerate specimens for PT. Must fill bottle to mark.
Turnaround:	1 day
Ref. Range:	Refer to report

PSA Total

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form

PTH

Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube delivered to the laboratory same day
Turnaround:	1 working day
Ref. Range:	On report form

PTH Related Peptide

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Contact lab for special tube
Turnaround:	1 - 3 weeks
Ref. Range:	On report form

Punch Biopsy

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.

Comment:	Health & Safety precautions. Where specimen is for DIF do not use fixative. See Immunofluorescence.
Report:	Histological diagnosis

Pyruvate Kinase Screening (PK)

Laboratory:	Haematology: -referred to Special Haematology, St James Hospital, Dublin 8.
Specimen:	1 x 3.0 mL K^3 EDTA blood
Turnaround:	2 weeks
Report:	Positive / Negative

Q Fever

See "Coxiella burnetii"

Quantiferon Test (Interferon Gamma Release assay – IGRA)

Laboratory:	Immunology
Specimen:	Set of 4 specific Quanitferon tubes and Quantiferon request form – available only from the Immunology dept. Refer to Section 11.12 for instruction on sample collection.
Comment:	The 4 samples must reach the laboratory within 16 hours of collection, Monday – Thursday only before 5pm. NO Friday samples accepted
Turnaround:	10 working days
Report:	Positive/Negative

Radiation Surgical specimens

Laboratory:	Histopathology Radiation Room
Specimen:	Formalin fixed tissue. Ensure that the container used is large enough to ensure volume of fixative x 2 times specimen size. Request form and specimen container must be clearly labelled as radioactive, with form information to include time, quantity and volume of dose given.
Comment:	The specimen should be delivered to the dedicated lab room for radioactive specimens, placed behind the lead lined shield, and lab staff informed of its presence there. Report: Histological diagnosis

RCD 11 Refractory Coeliac Disease Type 11 Detection by Flow Cytometry

Laboratory:	Haematology
Specimen:	Duodenal biopsies in RPMI.
Comment:	Requires prior arrangement with flowcytometry. RPMI is supplied by flowcytometry lab. Scientist collects sample directly from ward.
Turnaround:	3-5 working days
Ref. Range:	Interpretation by Consultant Haematologist on report form

Red Cell Folate

Laboratory:	Haematology, Referred to MedLab Pathology
Specimen:	3.0 mL K^3 EDTA blood, (1.0 mL Paediatric tubes are available).
Comment:	Requests should be received in the laboratory within 8 hours of phlebotomy
Turnaround:	3 weeks
Ref. Range:	Refer to report

Reducing Substances (Urine and Faeces)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	Faeces specimen, inclusive of liquid element of stool
Comment:	Must be frozen within 1hr of collection
Turnaround:	3 – 4 weeks
Report:	On report form

Renal Biopsy for Direct Immunofluorescence (DIF)

Laboratory:	Please notify Histopathology staff (ext. 4589) at least 24 hours in advance.
Specimen:	Place the biopsy in normal saline to maintain hydration and deliver to the laboratory immediately. Include contact details on request form.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Renal Biopsy for Electron Microscopy

Laboratory:	Please notify Histopathology Staff (ext. 4589) at least 24 hours in advance
Specimen:	Place the biopsy in normal saline to maintain hydration and deliver to the laboratory immediately. Include contact details on request form.
Comment:	Health & Safety precautions. Referred out for EM
Report:	Histological diagnosis

Renin

Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL K^+ EDTA blood
Comment:	Please provide clinical/antihypertensive medication details.
Turnaround:	3 weeks
Ref. Range:	On report form

Respiratory Virus PCR: SARS-CoV2; Influenza A and B; Respiratory Syncytial Virus (RSV)

Laboratory:	Virology
Specimen:	Combined nasal/throat swab in viral transport medium
Comment:	A rapid multiplexed real-time RT-PCR test used for the simultaneous, qualitative detection and differentiation of SARS-CoV-2, Influenza A, Influenza B, and respiratory syncytial virus (RSV). Please provide clinical details. Please note that patients that have recently received a live attenuated nasal vaccine (children) can result in false positive results. Extended respiratory virus testing is not routinely available but may be performed at request of consultant Paediatrician or on discussion with consultant microbiologist for investigation of respiratory illness in immunosuppressed or ICU patients.
Turnaround:	2- 3 working days
Report:	Detected/Not Detected. Results will be available on APEX or through EVOLVE immediately when technically validated.

Reticulocyte Count

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood, (1.0 mL Paediatric tubes are available).
Comment:	Requests should be received in the laboratory within 8 hours of phlebotomy.
Turnaround:	1 day
Ref. Range:	Refer to report

Rheumatoid Factor IgM

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	Requests for Rheumatoid Factor will also be tested for Anti-CCP
Turnaround:	4 working days
Ref. Range:	0 – 14 IU/ml

Rickettsia sp. antibodies

See “Coxiella”

ROS-1

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Tissue samples already processed by the Histopathology laboratory, arrange via Consultant Pathologist
Comment:	Test available on request by Pathologist
Referrals:	Contact the Department of Histopathology, Cytopathology and Molecular Pathology on 4078
Turnaround:	5-10 working days after request from Pathologist received
Report:	Integral part of Histopathology report issued by the Division of Anatomic Pathology, Department of Histopathology, Cytopathology and Molecular Pathology

Rotavirus / Adenovirus Faecal Antigen

Laboratory:	Medical Microbiology
Specimen:	Faeces collected in acute phase of illness 1-2g in leak proof container. Delay > 2 h refrigerate @ 2-8^{O}C.

Comment:	*Rotavirus* and *Adenovirus* are tested for in specimens from children aged less than 5 years of age.
Turnaround:	1 working day.
Report:	Rota / Adenovirus antigen detected/Not detected.

Rubella IgG Antibody

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Rubella IgG serology is performed for the assessment of immunity, usually as part of routine antenatal booking screen or occupational screen where MMR vaccination status is uncertain. It may also be used to assess the susceptibility of contacts of suspected or proven cases of Rubella - particularly pregnant women
Turnaround:	2 working days
Report:	Reported in IU/ml with relevant comment. A rubella IgG titre of >10IU/ml is considered protective against primary infection. Individuals with an antibody level of 5-10IU/ml will be reported by the NVRL as Rubella IgG antibody detected at low level. If this person has documented evidence of receiving at least one dose of Rubella vaccine no further vaccination is necessary.

Rubella PCR and/or IgM Antibody – Serology (or orocol)

Laboratory:	Virology: NVRL
Specimen:	Oral fluid PCR; 7.0 mL blood in a plain gel tube
Comment:	Rubella infection is now rare due to MMR vaccine
Turnaround:	2 working days
Report:	Detected/Not Detected

Salicylate

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. All other requests: 3hours.
Interpretation:	On report form

SARS CoV – 2 (PCR) –see Respiratory Virus PCR:

~~Laboratory:~~	~~Virology~~
~~Specimen:~~	~~Combined nasal/throat /nasopharyngeal swab in viral transport medium~~
~~Comment:~~	~~If delay refrigerate @ 2-8^{o}C.~~
~~Turnaround:~~	~~1 - 2working days~~
~~Report:~~	~~Detected/Detected weak/Not Detected~~
	~~Whole Genome Sequencing (WGS) is performed upon request of SARS-CoV-2 positive samples.~~

Schistosoma haematobium

Laboratory:	Medical Microbiology
Specimen:	Urine in sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Only performed on request on patients after recent travel to endemic area. Urine volume >10ml (The urine must be obtained between 10:00-14:00 h on the day of testing).
Turnaround:	1 working day
Report:	S. haematobium detected / not detected

Schistosomal haematobium antibodies

Laboratory:	Virology: -referred to the Hospital for Tropical Diseases~~, London WCIE 6AU~~
Specimen:	7.0 mL blood in a plain gel tube
Comment:	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~ **Travel or residence history essential.** Complications of chronic infection either genitourinary or intestinal symptoms depending on the *Schistosoma* species commonest presentation. Diagnosis is made by microscopic visualisation of eggs in stools or urine; supplemental approaches include serological testing or biopsy of affected tissues (rectum or bladder) for detection of parasite eggs. Note that serology may take several weeks to become positive after initial infection. Positive results do not differentiate between past or current (active)

	infection and neither can it indicate current burden. Serology should not be used to monitor therapeutic response
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected

Selenium	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0 mL trace element EDTA tube
Comment:	Transport to Lab ASAP
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Semen Analysis

See "Post-Vasectomy analysis"

Serum Amyloid A (SAA)	
Laboratory:	Immunology: referred to Immunology dept, Northern General hospital, Sheffield
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Ref. Range:	refer to report

Serum Protein Electrphoresis (SPE)

Refer to Immunoglobulins**.**

SHBG	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form

Sickle Screen (Sickledex)	
Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood
Comment:	Must give clinical details, transfusion history and ethnic origin of patient. Test not valid on children under six months of age. All sickledex requests are referred for further confirmation of results by HPLC.
Turnaround:	1 day for screen. 4 weeks for confirmation by HPLC
Report:	Positive / Negative

Sirolimus	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL EDTA blood
Turnaround:	1 – 3 weeks
Ref. Range:	Patient specific

Skin Punch Biopsy for Direct Immunofluorescence (DIF)	
Laboratory:	Please notify Histopathology staff (ext. 4589) at least 24 hours in advance.
Specimen:	Send the skin punch biopsy for DIF fresh. Place the biopsy in a fully labelled suitable sized container without any preservative and deliver to the laboratory immediately, with completed request form. Include contact details. If the biopsy is from outside University Hospital, Galway, the sample may be sent in a suitable transport medium (e.g. Michel's or Zeuss medium). Ensure the package is addressed to the Histology Lab rather than the Histology department. The specimen must be delivered directly to the Histology lab without delay.
Comment:	Health & Safety precautions
Report:	Histological diagnosis

Skin Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Only skin swabs with relevant clinical details will be processed

Turnaround:	3 working days
Report:	Any significant pathogen & sensitivities if required

Sodium

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

Sodium (Urine)

Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form

Sodium Valproate (Epilim)

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen immediately before next dose (trough specimen)
Turnaround:	1 week.
Therapeutic Range:	On report form

Somatomedin (IGF1)

See "IGF1"

Sputum Culture

Laboratory:	Medical Microbiology
Specimen:	Purulent specimen in 60ml sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Salivary specimens will be discarded. Specimens >48hr old will be rejected for culture.
Turnaround:	3 working days. For Cystic Fibrosis patients 7 days
Report:	Any significant pathogen & sensitivities if required.

Sputum - Cytology

Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	0.5 ml to 20 mL spontaneous or induced fresh specimen collected into a 20 mL or 50 mL twist top leak proof universal container.
Comment:	Indicate clinical history on test requisition and reason for test. Sputum must be deeply coughed from lungs. Avoid oral contamination and saliva. Early morning upon rising is the preferred collection time. Refrigerate if necessary.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells. Detection of infectious organisms.

Stem Cell Quantification

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood or specimen from aphaeresis collection.
Comment:	All Stem Cell quantifications must be preauthorized by Consultant Haematologist or SPR and prearranged with both laboratory and point of clinical activity. Specimen must be accompanied by special request form available from the Haematology laboratory and signed on receipt in the laboratory.
Turnaround:	1 day
Ref. Range:	N/A

Strongyloides antibodies

Laboratory:	Virology: -referred to the Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~ International travellers are generally at low risk for strongyloides infection. Strongyloides infection should be considered in people from endemic areas or those with soil exposure from endemic areas regardless of time since exposure. Clinical clues include **wheezing, abdominal distress, and eosinophilia. Stool ova and parasite tests** are relatively insensitive for detection

	of larvae but are **the tests of choice**. Please state if i**mmunosuppressed** e.g. **steroid use or HTLV-1 infection**. Serology recommended only if unexplained eosinophilia and negative stool specimens. Antibody levels normally detected **2 to 3 months post-exposure**, however, there are occasions when no antibody response will be detected. Antibody levels revert to negative approximately 6 months to 1 year post successful treatment.
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ As per Ref Lab report
Sural Nerve Biopsies	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Fresh tissue
Comment:	Immediate dispatch to laboratory where tissue pieces are osmicated/formalin fixed.
Report:	Histological diagnosis
Surgical Specimens for Histological Examination	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Formalin fixed tissue
Comment:	Health & Safety precautions
Report:	Histological diagnosis
Swab - Culture	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2h refrigerate @2-8°C
Turnaround:	3 working days and 5 days in the case of Neisseria gonorrhoeae culture.
Report:	Presence of significant pathogen and sensitivities if relevant.
Sweat Test	
Laboratory:	Clinical Biochemistry
Specimen:	Sweat collected by the Macroduct Sweat Collection System
Turnaround:	Newborn screening programme samples: 1hour. All other samples: 1 working day
Ref. Range:	On report form
Synovial Fluid	
Laboratory:	Medical Microbiology
Specimen:	Specimen in sterile container. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days.
Report:	Any significant pathogen & sensitivities if required.
Synovial Fluid – Cytopathology	
See Joint aspirate"	
Syphilis (Treponema pallidum) antibodies	
Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube. (Specialised testing of other specimens e.g. CSF on discussion)
Comment:	Serological tests (nontreponemal and treponemal specific), in addition to patients' clinical history, are currently the primary methods for the diagnosis and management of syphilis.
Turnaround:	2-3 working days
Report:	Detected/ Not Detected; RPR titre if performed.
T3 (Total)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	1 week
Comment:	Assay only available by request from Endocrine Team or by prior agreement with Dr. Damian Griffin
Ref. Range:	On report form
Tacrolimus (Prograf/Advagraf)	
Laboratory:	Clinical Biochemistry
Specimen:	4.0 mL K^+ EDTA blood
Comment:	Collect sample pre-dose. State date/time of sample collections clearly on request form.

Turnaround:	1 week
Ref. Range:	Patient specific

Tambocor Levels

See “Flecainide”

Tartrate Resistant Acid Phosphatase (TRAP) Cytochemical Stain

Laboratory:	Haematology
Specimen:	3.0 mL K^3 EDTA blood/Bone marrow slides
Comment:	Prior authorization by Haematology SPR. To reach lab within 8 hours of phlebotomy.
Turnaround:	2 days
Ref. Range:	N/A

Tear Duct - Culture

Laboratory:	Medical Microbiology
Specimen:	Swab in Transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	4 working days.
Report:	Any significant pathogens & sensitivities if required.

Teriflunomide (Leflunomide)

Laboratory:	Clinical Biochemistry – referred to external laboratory for analysis
Specimen:	Test kit must be pre-ordered with special tubes, consultation with clinical team required before test kits are ordered
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Testosterone

Laboratory:	Clinical Biochemistry
Specimen:	7.0mL blood in a plain gel tube collected between 8 -10 am
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form

Tetanus Toxoid IgG Antibodies

Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	15 working days
Ref. Range:	Minimum Protective Level > 0.01 IU/mL Optimum Protective Level > 0.10 IU/Ml

Theophylline (Aminophylline)

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Take specimen immediately before next dose (trough specimen)
Turnaround:	1 week
Therapeutic Range:	On report form

Thiamine

See “Vitamin B”

Thiopurine methyl transferase (TPMT)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	5.0 mL K^+ EDTA blood
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Throat Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days.
Report:	Haemolytic Streptococci isolated/Not isolated.

Thrombophilia Screen (incl: PT/INR, APTT, Fibrinogen (derived), Antithrombin, Protein C, Free Protein S, APC Resistance, Lupus inhibitor)	
Laboratory:	Haematology
Specimen:	4 x 2.7 mL blood in a 0.109m Sodium Citrate tube.
Comment:	Requests should be received in the laboratory within 4 hours of phlebotomy Mon – Fri during routine working hours. Clinical details and relevant patient and family history are required. Testing should not be done during thrombotic period or while the patient is on anticoagulant therapy. Must fill bottles to mark.
Turnaround:	5 weeks
Ref. Range:	Refer to report
Thyroglobulin	
Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	1 – 3 weeks
Ref. Range:	On report form
Thyroxine Free (Free T4)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form
Total Iron Binding Capacity (TIBC)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube. Fasting specimen required.
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form
Tissue	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology y
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis
Tissue/ Biopsy	
Laboratory:	Medical Microbiology
Specimen:	Specimen in Sterile container for routine culture and microscopy. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days, may be extended to 7 days on consultant request.
Report:	Growth / No growth & sensitivities if required.
Tobramycin	
Laboratory:	Medical Microbiology. Referred to external laboratory, cut off time (12.00) for same day referral.
Specimen:	7.0 mL blood in a plain gel tube. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	State time collected and if Peak or Trough specimen
Turnaround:	1 day.
Ref. Range:	Post dose/Peak: 5-8mg/L. Pre-dose/Trough: <1.0mg/L (once daily) &<2.0mg/L Multi dose).
Toxicology Screen	
Vague request	**Should not be used on request forms.** Instead, urine drugs of abuse screen or testing for a specific drug / metal of concern is more appropriate.
Toxocara Antibodies	
Laboratory:	Virology: -referred to the Department of Clinical Parasitology, Hospital for Tropical Diseases,Mortimer market, London WCIE 6JB
Specimen:	7.0 mL Blood in a plain gel tube. (CSF or eye samples on discussion with Ref Lab).
Comment:	Only available in specific cases and following approval by the Microbiology Medical Staff. Toxocariasis usually occurs following the ingestion of embryonated eggs in infected dog (Toxocara canis) or cat (Toxocara cati) faeces. Infections are often asymptomatic except for

eosinophilia but occassionaly result in Visceral Larva Migrans with concurrent symptoms (fever, anorexia, weight loss, cough, wheezing, rashes, hepatosplenomegaly) and Ocular Larva Migrans to produce various ophthalmologic lesions.

The Toxocara IgG antibody ELISA test against larval excretory/secretory antigen is the most appropriate method for diagnosis. Sensitivity is 91% and specificity is 86% (with cross reactivity possible with strongyloidiasis, trichinosis, amoebiasis and fascioliasis). Positive ELISA tests (and high negative sera) will have Western blot performed. Negative Toxocara serology on serum does NOT exclude ocular toxocariasis. Vitreous sampling may be necessary to confirm or exclude ocular toxocariasis. Discussion prior to sending is essential.

Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ Results are expressed as an optical density value with Ref Lab comment.

Toxoplasma gondii IgM; IgG antibodies; avidity; dye test

Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube. Other samples may include: Amniotic Fluid; Aqueous fluid; CSF; EDTA blood; Tissue; Vitreous Fluid – require discussion with consultant Microbiologist.
Comment:	Used to screen for evidence of toxoplasma infection. It is mostly used in the investigation of **lymphadenopathy, unexplained febrile illness and possible exposure or infection in pregnancy**. Investigation of toxoplasma infection in immunocompromised (e.g. HIV associated cerebral infection) or ocular infection should be discussed with Consultant Microbiologist.
Turnaround:	1-2 working days
Report:	IgG Detected~~/~~Not Detected IgM Not detected. Locally reactive samples are referred to the Toxoplasma Reference Laboratory, Swansea for confirmation and extended testing

~~**Toxoplasma gondii IgM antibodies**~~

~~Laboratory:~~	~~Virology~~
~~Specimen:~~	~~7.0 mL blood in a plain gel tube~~
~~Turnaround:~~	~~1-2 working days~~
~~Report:~~	~~Not Detected, if negative. A Provisional report will be issued on any sample giving reactive findings on initial testing. These specimens are referred to the Health Protection Agency, Singleton Hospital Swansea SA2 8QA for further testing and a final report.~~

~~**Toxoplasma gondii antibody /avidity/dye test**~~

~~Laboratory:~~	~~Virology: Referred to the Health Protection Agency, Singleton Hospital, Swansea SA2 8QA~~
~~Specimen:~~	~~7.0 mL blood in plain gel tube~~
~~Comment:~~	~~Available only in specific cases and approval of a Consultant Microbiologist~~
~~Turnaround:~~	~~1 – 2 weeks~~
~~Report:~~	~~Detailed report with relevant comment.~~

Transferrin

Laboratory:	Clinical Biochemistry
Specimen:	7ml blood in plain gel tube. Fasting specimen required.
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

% Transferrin Saturation

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube. Fasting specimen required.
Comment:	Calculated Parameter
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form

Transfusion Pack (Blood product) for culture

Laboratory:	Medical Microbiology
Specimen:	Bactec Blood culture vials. If delay leave on ward until collection by Porter.
Comment:	Ensure labeling as per Haemovigilance procedure.
Turnaround:	1 week.
Report:	Any Growth.

Transthyretin (pre-albumin)

See "Pre-albumin"

Travel related infections, Rare and Imported Pathogens Laboratory (RIPL) testing:
****CLINICAL and TRAVEL details ESSENTIAL – CALL TO DISCUSS****
Also consider: Leptospirosis, Q fever, anthrax, plague, typhus, Malaria and enteric fever (*Salmonella typhi,* typhoid) as well as more common local infections infections like meningitis, respiratory viruses and invasive streptococcal infection.

Laboratory:	Virology with most testing and/or confirmatory testing performed at NVRL and/or Rare and Imported Pathogens Laboratory (RIPL), Porton Down Uk
Specimen:	Clotted blood (5-10ml); EDTA Whole Blood (8ml Greiner tube); (Depending on clinical features; may include: Cerebrospinal fluid (CSF, 500uL min); Joint fluid; Post-Mortem Specimens; Pus; Semen; Swab; Tissue; Urine (1ml min); Vesicle Fluid/Swabs.)
Comment:	**Essential to contact on-call Microbiology Consultant to discuss clinical features.** **Clinical and travel details with dates are essential to permit appropriate test selection and expedite referral as** the presentation of most imported diseases is very similar and co-infections with more than one pathogen may occur**.** Potential pathogens that may be tested after discussion include: Arboviruses and **Rickettsiae** (spotted fever and epidemic typhus groups) are causes of febrile illness in returning travellers from many areas. **Arbovirus** (derived from **ar**thropod-**bo**rne) includes a diverse group of viruses that are typically transmitted by mosquito bite, including: Flaviviruses (e.g.West Nile, Japanese Encephalitis, Yellow Fever, Dengue, Murray Valley, Tick Borne Encephalitis group Viruses), **Bunyaviruses and Togaviruses** (e.g. Ross River, Sindbis, Eastern equine, Western equine viruses). Less frequently, illness caused by **viral haemorrhagic fevers (VHF)** (Lassa, Ebola, Marburg, Crimean Congo Haemorrhagic fever) may have to be considered. The following viruses also have the potential to cause haemorrhagic features: **Hantaviruses, Chikungunya, Rift Valley fever, Dengue and Yellow fever viruses.**
Turnaround:	Varies with tests required
Report:	As per Reference Lab

Trichomonas vaginalis

Laboratory:	Medical Microbiology
Specimen:	Urethral or Endo-Cervical swab in transport medium (charcoal).
Turnaround:	3 working days
Report:	*Trichomonas vaginalis* detected / not detected. This is a non-accredited test.

Trichomonas vaginalis (TV) PCR

Laboratory:	Virology
Specimen:	Abbott Multicollect swab or urine (first void in an Abbott Multicollect),, preferably delivered to the laboratory within 24 h of collection.
Comment:	Available only upon request ~~in very specific cases.~~ Please provide clinical details.
Turnaround:	10 days
Report:	Not detected/ Detected weak / Detected

Triglycerides

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Comment:	Ideally a patient should fast for 12 hours. However, if a patient in unable or unwilling to fast for 12 hours a specimen taken after a 9 hour fast is acceptable".
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days

Ref. Range:	On report form

Tropheryma whipplei	
Laboratory:	Virology: Referred to The Leeds Teaching Hospital, St. James University hospital, Beckett Street, Leeds, LS9 7TF.
Specimen:	3.0 ml EDTA whole blood
Turnaround:	2-3 weeks
Ref. Range:	As per referral Lab
Troponin T	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. All other requests: 3 hours
Ref. Range:	On report form
Trypanosoma cruzi Antibodies	
Laboratory:	Virology: - referred to the Hospital for Tropical Diseases, London WCIE 6AU
Specimen:	7.0 mL blood in a plain gel tube
Comment:	**Clinical details essential**. Serological testing for Chagas disease may be considered in thoise from **Latin America** if: 1.Women of child-bearing age or **pregnant**. Detection during **pre-conception testing** can reduce risk of vertical transmission to infants. 2. **Cardiac or gastrointestinal disease**. 3. **Immunosuppressed,** particularly those with **HIV infection, undergoing transplantation or cancer chemotherapy.** 4. Pre-organ donation
Turnaround:	2 – 3 weeks
Report:	~~Positive/Negative~~ Detected/Not detected
Tryptase (Mast Cell)	
Laboratory:	Immunology
Specimen:	5.0 mL blood in plain gel tube
Comment:	For investigation of anaphylaxis serial samples are required and the timing must be specified. Timing of samples: Immediately after resuscitation (record time); at 1-2 hours post reaction (record time) and at 24 hours post reaction (baseline)
Turnaround:	10 working days
Ref. Range:	0-14 units
TSH (Thyroid Stimulating Hormone)	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Priority: 1 working day. Routine: 2 working days
Ref. Range:	On report form
Tuberculosis Testing	
Laboratory:	Medical Microbiology
Specimen:	Specimen of sputa, BAL in sterile 60 mL container. Early Morning Urine in a 100 mL sterile container (testing of Early Morning Urines are not routinely processed and are strictly subject to Microbiology Consultant Approval). Fluids/ Tissues to Sterile containers. Blood Culture / Bone Marrow aspirate, heavily blood stained fluids to Bactec Myco/Lytic (red cap) vials.
Comment:	Delay > 2 h refrigerate @ 2-8^{O}C. Culture is performed on all tissue and fluid samples where clinical details query MOTT. The mycobacteria culture system is not validated for processing urine specimens. The Department of Medical Microbiology does not routinely accept more than three sputum specimens for Mycobacterium culture in a single episode of illness
Turnaround:	Microscopy: 1 working day. Culture: 6 to 7 weeks.
Report:	Mycobacteria species isolated/Not isolated.
Tumour	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen intact to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions.

Report:	Histological diagnosis
TURP	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology
Specimen:	Submit specimen to laboratory in 10% Neutral Buffered Formalin.
Comment:	Health & Safety precautions
Report:	Histological diagnosis
Ulcer Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment	Rejected in the absence of relevant clinical details.
Turnaround:	3 working days.
Report:	Any significant isolates / No pathogens isolated.
Urea	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form
Urea (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form
Urethral Swab	
Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 hr Refrigerate @ 2-8^{O}C.
Turnaround:	4-5 working days
Report:	Any significant isolates & sensitivities if required.
Uric Acid	
Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube
Turnaround:	Urgent: 1hour. Priority: 3 hours. Routine: 2 working days
Ref. Range:	On report form
Uric Acid (Urine)	
Laboratory:	Clinical Biochemistry
Specimen:	24 hour urine collection
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	1 working day
Ref. Range:	On report form
Urine Culture – Midstream Urine	
Laboratory:	Medical Microbiology
Specimen:	Specimen of Urine in Urine vacuum tube container.
Comment:	Urine taken at mid-point of urination. Delay >2 h refrigerate @ 2-8^{O}C
Turnaround:	Microscopy: 4 hrs for Urines received 8am to 12 midnight. Paeds Urines only processed post-midnight. Culture: 3 working days. MSU culture is only routinely performed on samples form children <16 yrs of age, maternity patients, clinical details specifying patient is neutropenic or immunocompromised, and patients with a microscopy result >20cmm. However culture may be requested in certain circumstances following discussion with a Consultant Microbiologist.
Report:	Microscopy: Cell count. Culture: Presence of significant pathogen and sensitivities if relevant.
Urine - Diagnostic Cytology	
Laboratory:	Department of Histopathology, Cytopathology and Molecular Pathology

Specimen:	Immediate fixation is necessary. Collect 10 – 20 mL fresh voided or catheterized urine or bladder wash specimen into a universal bottle containing Shandon Cytospin Collection Fluid (green fixative solution) available from the Diagnostic Cytology laboratory.
Comment:	Indicate clinical history on test requisition and reason for test. Patients must be well hydrated before collecting urine. Any instrumentation must be noted on the requisition form. For routine urine collection, emphasize the need for a clean catch specimen. Random mid-day collection is preferred. First morning specimen is not suitable for Cytological analysis. Refrigerate specimens overnight if necessary.
Turnaround:	80% by 5 working days
Report:	Detection of neoplastic and non-neoplastic cells

Urine Drugs of Abuse Screen (benzodiazepines, barbiturates, opiates, cocaine, ecstasy, cannabis, amphetamine, methadone, alcohol)

Laboratory:	Clinical Biochemistry - referred to external laboratory for analysis
Specimen:	10.0 mL fresh plain urine
Turnaround:	2 – 3 weeks
Comment:	Parental consent required in patients <18 years old
Report:	Information provided on returned report

Urine Protein Electrophoresis

Refer to 'Bence Jones Protein'

Urine Protein Creatinine Ratio (PCR)

Laboratory:	Clinical Biochemistry
Specimen:	Urine: *Early morning* sample preferred
Turnaround:	1 working day
Ref. Range:	On report form Interpretation: UTI should be considered. Persistent proteinuria (2 abnormal PCR's at least 1 week apart) is a significant risk factor for both renal & cardiovascular morbidity & mortality. Management guidance at: *http://www.nephrology.ie/images/CKD_Ireland.pdf*

Urine Schistosomiasis (see Schistosoma haematobium)

Laboratory:	Medical Microbiology
Specimen:	On patients after recent travel to endemic area. Urine volume >10mL. (The urine must be obtained between10:00-14:00 on the day of testing). Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	1 working day.
Report:	S. haematobium detected / not detected**.**

Ustekinumab (trough levels and antibodies)

Laboratory:	Immunology: – referred externally to Eurofins Biomnis
Specimen:	5.0 mL blood in plain gel tube
Turnaround:	6 weeks
Report:	Drug levels and antibodies.

Vaginal Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Only Endocervical swabs Urethral swabs and IUCDs are routinely cultured for *N. gonorrhoeae*. All other specimens must specify *N. gonorrhoeae* on request if required. N gonorrhoeae testing on other sample is subject to Microbiology Consultant approval.
Turnaround:	3 working days.
Report:	Any significant isolates & sensitivities if required.

Vancomycin

Laboratory:	Clinical Biochemistry
Specimen:	7.0 mL blood in a plain gel tube. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	State time collected and if Peak or Trough specimen
Turnaround:	Analysed during routine working hours only.
Ref. Range:	On report form

Vancomycin Resistant Enterococci (VRE)	
Laboratory:	Medical Microbiology
Specimen:	Rectal Swab in transport medium/Faeces sample. Delay > 2 h refrigerate @ 2-8^{O}C.
Comment:	Restricted to specific groups of hospitalized patients. Non-hospitalized patients are screened by prior arrangement with a Consultant Microbiologist.
Turnaround:	3 working days.
Report:	VRE isolated/Not isolated.

Varicella-Zoster Virus (VZV) IgG antibodies	
Laboratory:	Virology
Specimen:	7.0 mL blood in a plain gel tube.
Comment:	Samples from pregnant patients who have been in contact with chickenpox are processed urgently if received before 2pm Monday to Friday. The request must be marked as Urgent with clinical details, and the requesting clinician's contact number, clearly stated. The laboratory should be contacted (Ext 4398) to alert staff that the sample is in transit. Used to assess the susceptibility of immunocompetent patients to varicella infection and to detect evidence of prior infection. The assay is not intended to diagnose acute infection and should not be performed on patients with symptoms of chickenpox or shingles unless discussed with Microbiologist. Where Varicella immunity is determined to be uncertain, specimens will be referred for quantitative antibody measurement. **Always indicate whether patient is pregnant or immunocompromised and give details of exposure including contact date**
Turnaround:	5 working days. Samples from pregnant patients who have been in contact with chickenpox are processed urgently if received before 2pm Monday to Friday. The request must be marked as Urgent with clinical details, and the requesting clinician's contact number, clearly stated. The laboratory should be contacted (Ext 4398) to alert staff that the sample is in transit. Indeterminate results are referred to the NVRL for confirmation.
Report:	Reported as Detected/ Not detected/ Indeterminate with relevant comment. .

Varicella-zoster Virus ~~IgM~~ PCR	
Laboratory:	Virology: - referred to National Virus Reference Laboratory
Specimen:	Vesicular fluid or skin scrapings in a Viral Transport Medium swab
Comment:	VZV IgM testing is **not** the test of choice for the diagnosis of primary infection, as a negative IgM result does not exclude a diagnosis of chickenpox. VZV IgM testing is **not** recommended for the diagnosis of 'shingles' (Herpes Zoster). IgM will only be performed if lesion swabs are not possible
Turnaround:	~~2 - 3 weeks.~~ 5 working days
Report:	Detected / Not Detected

Vedolizumab (trough levels and antibodies)		
Laboratory:	Immunology	
Specimen:	5.0 mL blood in a plain gel tube	
Turnaround:	5 working days	
Interpretation:	Induction (week 2)	≥28µg/ml
	Induction (week 6)	≥24µg/ml
	Post induction (week 14)	≥15µg/ml
	Maintenance	≥12µg/ml
Comment:	Antibodies to Vedolizumab will be reflex tested if necessary. Negative = <10ng/mL	

Very Long Chain Fatty Acids
See "Leucodystrophy Screen"

Vincent's Angina	
Laboratory:	Medical Microbiology
Specimen:	Mouth Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days.
Report:	Vincent's organisms seen/not seen.

Vitamin A (Retinol)	
Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis

Specimen:	5.0 mL blood in a non-gel tube, protect from light
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Vitamin B1 (Thiamine)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL K^+ EDTA blood on ice. Contact laboratory before collection. Mon/Tues. morning only. Ensure sample is protected from light
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Vitamin B2 (Riboflavin)

Laboratory:	Clinical Biochemistry: - referred to external laboratory for analysis
Specimen:	4.0 mL K^+ EDTA blood on ice. Contact laboratory before collection. Mon/Tues. morning only Ensure sample is protected from light
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

Vitamin B6 (Pyridoxyl Phosphate)

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	4.0 mL K^+ EDTA blood on ice. Contact laboratory before collection. Mon/Tues. morning only Ensure sample is protected from light
Turnaround:	1 – 3 weeks
Ref. Range:	On report form gHb

Vitamin B12

Laboratory:	Haematology
Specimen:	5.0 mL blood in a plain gel tube
Comment:	Specimen to be received within 24hrs of phlebotomy for whole blood and 2 days if sample is spun and refrigerated.
Turnaround:	4 days
Ref. Range:	Refer to report

Vitamin D

Laboratory:	Clinical Biochemistry (Requests for testing are subject to provision of appropriate clinical details on request form)
Specimen:	7.0mL blood in a plain gel tube
Turnaround:	2 working days
Ref. Range:	On report form

Vitamin E (Tocopherol)

Laboratory:	Clinical Biochemistry: -referred to external laboratory for analysis
Specimen:	5.0 mL blood in a non-gel tube, protect from light
Turnaround:	1 – 3 weeks
Ref. Range:	On report form

VMA - Vanillylmandelic acid - Urine

Laboratory:	Clinical Biochemistry - referred to external laboratory for analysis
Specimen:	24 h acidified urine preferred, alternatively 20 mL urine must be acidified within 1 hour of voiding.
Comment:	Only send specimen to the laboratory during normal working hours.
Turnaround:	7 days
Interpretation:	As per returned report
Of note:	Patient should avoid paracetamol during the urine collection.

Von Willebrands Screens

Laboratory:	Haematology
Specimen:	2 x 2.7 mL blood in 0.109m Sodium Citrate tubes. (1.0 mL Paediatric tubes are available).
Comment:	Requests should be received in the laboratory within 8 hours of phlebotomy. Must fill bottle to mark.

Turnaround:	4 weeks
Ref. Range:	Refer to report

VRE

See "Vancomycin Resistant Enterococci"

Weil's Disease

See "Leptospira IgM"

White Blood Cell Differential Cell Count

Laboratory:	Haematology.
Specimen:	3.0 mL K^3 EDTA blood, (1.0 mL Paediatric tubes are available) or Blood film. Laboratory will make blood film on fresh blood.
Comment:	White Cell Differential will be done automatically on all fresh FBC specimens. As EDTA artifacts can appear within 2 hours of phlebotomy it is important that films (where necessary) are made from fresh blood (less than one day old).
Turnaround:	1 day routine specimens, Specimens received on emergency form: 2 hours.
Ref. Range:	See report form.

White Cell Enzyme Studies (Screen for Hurler's)

See "Lysosmal Enzyme Screen"

Whooping Cough

Laboratory:	Medical Microbiology – referred to Our Lady's Children's Hospital Crumlin [OLCHC]
Specimen:	Pernasal swab (available from Medical Microbiology). Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	10 days.
Report:	*Bordetella* sp isolated / not isolated.

Whooping Cough antibodies

See "Bordetella pertussis."

Wound Swab

Laboratory:	Medical Microbiology
Specimen:	Swab in transport medium. Delay > 2 h refrigerate @ 2-8^{O}C.
Turnaround:	3 working days.
Report:	Any significant pathogens & sensitivities if required.

Yellow fever antibodies see Travel section

~~Laboratory:~~	~~Virology: - referred to the Health Protection Agency, Special Pathogens Reference Unit, Porton Down, Salisbury SP4 OJG~~
~~Specimen:~~	~~7.0 mL blood in a plain gel tube~~
~~Comment:~~	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~
~~Turnaround:~~	~~1 – 3 weeks~~
~~Report:~~	~~Positive/Negative~~

Yersinia ~~Antibodies~~ PCR developmental assay in UK may be available after discussion and full clinical details

~~Laboratory:~~	~~Virology: - referred to the Health Protection Agency, Laboratory of Enteric Pathogens, Colindale, London NW9 5EQ~~
~~Specimen:~~	~~7.0 ml blood in a plain gel tube~~
~~Comment:~~	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~
~~Turnaround:~~	~~2 – 3 weeks~~
~~Report:~~	~~Detected/Not Detected~~

Zinc

Laboratory:	Clinical Biochemistry. Referred to external laboratory.
Specimen:	7.0 mL blood in a Na^+. EDTA trace element tube.
Comment:	Transport to Lab ASAP
Turnaround:	3 weeks
Ref. Range:	On report form

Zika

Laboratory:	Virology. Referred to the National Virus Reference Lab.
Specimen:	7.0 ml blood in a plain gel tube

Comment:	~~Only available in very specific cases and following approval by a Consultant Microbiologist~~ Samples will only be referred for testing if **relevant clinical and travel details** are provided. Zika virus is a mosquito-borne virus. The majority of patients infected are asymptomatic. However, a small proportion of infections result in a mild, self-limited illness with **fever, rash, arthralgia and conjunctivitis.** Infection may be more serious in pregnant women and infection with Zika may cause microcephaly and other congenital malformations. Zika virus testing service is **only available for individuals who have had symptoms suggestive of Zika infection with relevant epidemiology.** The following are NOT indications for testing: Asymptomatic pregnant women who have travelled from Zika-affected countries; Asymptomatic returned male travellers whose partners are currently pregnant; Asymptomatic returned male and female travellers who are trying to conceive. Please Note that symptoms such as **coryza, cough and/or sore throat** suggest **upper respiratory tract infection and not Zika virus infection.**
Turnaround:	3 weeks
Report:	~~Full report received from referral laboratory~~ Reference laboratory report

GLOSSARY OF ABBREVIATIONS

List of abbreviations used in the Hand Book

AAFB	Acid Alcohol Fast Bacilli
AAT	Alpha-1-antitrypsin
ACR	American College of Rheumatology
AChR	Acetylcholine Receptor
ADR	Accord for Transport of Dangerous Goods by Road
ALP	Alkaline Phosphatase
ALT	Alanine Aminotransferase
ANA	Anti-Nuclear Antibodies
ANCA	Anti-neutrophil cytoplasmic antibodies
APTT	Activated partial thromboplastin time
ASAP	As Soon As Possible
AST	Aspartate aminotransferase
BAL	Bronchoalveolar Lavage
BJP	Bence Jones Protein
BMA	Bone Marrow analysis
BN	Board Number
C3	Third component of complement
C4	Fourth component of complement
CCP	Cyclic citrullinated peptide
CIS	Clinical Information System
CK	Creatine Kinase
CM	Centimetre
CMV	Cytomegalovirus
CNS	Central Nervous System
CPA	Clinical Pathology Accreditation (UK)
CRP	C-reactive protein
C/S	Culture and Sensitivity
CSF	Cerebrospinal Fluid
CSU	Catheter Specimen Urine
CTICU	Cardiothoracic intensive care unit
D	Day
ED	Emergency Department
EDTA	Ethylene Diamine Tetra Acetic Acid (anticoagulant)

ENA	Extractable Nuclear Antigens
ESR	Erythrocyte Sedimentation Rate
FBC	Full blood count
FISH	Fluorescent in situ hybridisation
GAD	Glutamic acid decarboxylase
GBM	Glomerular basement membrane
GBTE	Galway Blood & Tissue Establishment
GGT	Gamma glutamyl transferase
G & H	Group and Hold
GMS	General medical service
GP	General Practitioner
GUH	Galway University Hospital
H	Hour
HAE	Hereditary Angio-oedema
Hb	Haemoglobin
$HbA1_c$	Glycated haemoglobin
HBsAg	Hepatitis B surface antigen
HCG	Human chorionic gonadotrophin
HDL	High density lipoprotein
HDU	High dependency unit
HIV	Human Immunodeficiency Virus
HPLC	High Performance Liquid Chromatography
HSE	Health Service Executive
HSV	Herpes Simplex Virus
HTLV	Human T-Lymphocyte Virus
ICU	Intensive care unit
IBST	Irish Blood Transfusion service
Ig	Immunoglobulin
INR	International normalised ratio
LDH	Lactate dehydrogenase
LDL	Low density lipoprotein
LIS	Laboratory Information System
LUH	Letterkenny University Hospital
MG	Myasthenia Gravis
MUH	Mayo University Hospital
MGUS	Monoclonal gammopathy of unknown significance
MPUH	Merlin Park University Hospital

MPO	Myeloperoxidase
MSU	Mid-Stream Urine
Myco/F	Mycobacteria / Fungi
N/A	Not applicable
NSAIDS	Non steroid anti-inflammatory drugs
OPD	Out Patients Department
O/P	Ova and Parasites
PAS	Patient Administration System
PBC	Primary Biliary cirrhosis
PBU	Premature baby unit
PCR	Polymerase Chain Reaction
PM	Polymyositis
POC	Point of care
PR	Proteinase
PTH	Parathyroid hormone
PTS	Pneumatic Tube System
PUH	Portiuncula University Hospital
RAST	Radioallergosorbent test
RBC	Red Blood Cell
RUH	Roscommon University Hospital
RIBA	(Strip Immunoassay)
RIS	Radiotherapy Information System
RNP	Ribonucleo Protein
RT	Room Temperature
SCU	Special Care Unit
SD	Solvent Detergent
SLE	Systemic lupus erythematosus
Sm	Smith
SMA	Smooth Muscle antibody
SPEP	Serum Protein Electrophoresis
SPR	Specialist Registrar
T4	Thyroxine
TA GvHD	Transfusion associated graph versus host disease
TAT	Turnaround time
TB	Tuberculosis
TIBC	Total iron binding capacity
TPO	Thyroid peroxidase

TSH	Thyroid stimulating hormone
tTg	Transglutaminase antibodies
UCD	University College Dublin
GUH	University Hospital Galway
UIBC	Unbound iron binding capacity
UK	United Kingdom
UN	United Nation
UPEP	Urine Protein Electrophoresis
VGCC	Voltage gated calcium channels
VRL	Virus Reference Laboratory
W	Week
WBC	White blood cell count