CORK UNIVERSITY HOSPITAL
LABORATORY MEDICINE USER HANDBOOK

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

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
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<tbody>
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<td>N</td>
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<td>U</td>
<td>V</td>
<td>W</td>
<td>X</td>
<td>Y</td>
<td>Z</td>
</tr>
</tbody>
</table>

Reference No: PPG-CUH-PAT-31  
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Author: Mr Paul Cantwell  
Owner: Mr Paul Cantwell

Approver(s): Dr Michael Jansen, Ms Sinead Creagh  
Approval Date: 24/09/2018, 21/09/2018
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2 AMENDMENT TABLE

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

<table>
<thead>
<tr>
<th>Amended Section(s)</th>
<th>Amendment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Introduction</td>
<td>No change</td>
</tr>
<tr>
<td>4 General information</td>
<td></td>
</tr>
<tr>
<td>• 4.1 Location of the laboratory</td>
<td>No change</td>
</tr>
<tr>
<td>• 4.2 Opening Hours and Laboratory Telephone Extension Numbers</td>
<td>Changed 4.2 Pathology Histopathology sample deadline to 16:30 Mon-Fri Removed breastcheck and Deirdre Galvin from contact details Changed consultant pathologist to consultant pathologist/clerical office. Removed reference to EM bleep</td>
</tr>
<tr>
<td>• 4.3 Contact Details</td>
<td>Updated contact details for Consultant Clinical Biochemist and Duty Biochemist. Removed Dr. Cryan, Microbiology (retired) Haematology: Removed Dr Susan O'Shea, Consultant Haematologist and added Dr Oonagh Gilligan, Consultant Haematologist.</td>
</tr>
<tr>
<td>• 4.5 The laboratory’s complaint procedure</td>
<td>Updated website links</td>
</tr>
<tr>
<td>• 4.6 Policy on protection of personal information</td>
<td>Updated Data Protection Act to 2018</td>
</tr>
<tr>
<td>• 4.7 Instructions for transportation of samples, including any special handling needs</td>
<td>Biochemistry added: Please contact the laboratory for information on the correct procedure for centrifugation and specimen storage prior to transport to the laboratory.</td>
</tr>
<tr>
<td>5 Types of clinical services</td>
<td></td>
</tr>
<tr>
<td>• 5.5. Department of Pathology (Neuropathology/Autopsies/Brain Referrals)</td>
<td>Inserted the following :- Post mortem examinations that are required for investigation of unexplained or incompletely investigated rapidly progressive neurodegenerative disease/dementia (i.e. where prion disease (transmissible spongiform encephalopathy) has not been satisfactorily excluded from the differential diagnosis) are not carried out in this institution as required biocontainment facilities are not available.</td>
</tr>
<tr>
<td>• 5.5. Department of Microbiology</td>
<td>Influenza testing in performed in-house during Flu Season. Carbapenemase Producing Enterobacteriales (CPE) as approved by the Microbiology Medical Team.</td>
</tr>
<tr>
<td>5.6 Point of Care Testing</td>
<td>Removed reference to POCT Committee</td>
</tr>
<tr>
<td>6 Patient-Collected Samples</td>
<td>No change</td>
</tr>
<tr>
<td>7 Ordering of examinations</td>
<td></td>
</tr>
<tr>
<td>• Section 7.2</td>
<td>New section: Format of Addressographs</td>
</tr>
<tr>
<td>• Section 7.3</td>
<td>Biochemistry updated: Date and time of specimen collection Clinical details Note: Certain analytes may not be processed if mandatory fields are incomplete Request must come from a Qualified Healthcare Professional. Microbiology: Moved clinical information from essential information to desirable information</td>
</tr>
<tr>
<td>• Section 7.4</td>
<td>Microbiology updated: CSF samples are stored for approximately 2 week from reception date, therefore,</td>
</tr>
</tbody>
</table>
additional testing can be requested at any stage during this time.

## 8 Sample Collection

### 8.5 Sample storage conditions

**Microbiology:**
Molecular Investigation: Viral swabs for Influenza investigation are provided directly from the Microbiology Department and should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8°C. Collection swabs for Molecular Investigation of Carbapenemase Producing Enterobacteriales (CPE), will be provided by the Microbiology Department by liaising with Medical Microbiology Team and should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8°C.

**Pathology:**
Responsibility for receipt of report lies with the requesting clinician.

### 9 Healthlink Messaging - Electronic delivery of reports to the GP practice

**Biochemistry:** Updated table according to RCPI Guidelines.

### 9.2 Critical Results Reporting

**Biochemistry:** Updated table according to RCPI Guidelines.

## 10 Information Technology

No change.

## 11 On-Call (Emergency Service)

- Changed CRP and HCG from Restricted tests to Unrestricted.

## 12 Blood Transfusion

Updated to include data from 2017.

- Included Foetal DNA Rh D Screen.

## 13 Test Directory (A-Z)

- **Adenovirus (faeces samples)**
  See Rotavirus/Adenovirus assay.

- **Alpha 1 Antitrypsin**
  Included: 1.0–2.1 g/L (Adult). Contact Biochemistry lab for paediatric age-related ranges. If AAT result is <1g/L, sample is referred to the Alpha 1 Foundation.

- **Ammonia**
  Updated Ref range Serum/Plasma: 10-47 umol/L

- **Anti Neutrophil Antibodies, Granulocyte Immunology and Auto immune Neutropenia**
  Turn around time: 64 days

- **BCR ABL (Philadelphia Chromosome), PML-RARa, JAK2 in MPD (and CALR)**
  Turn around time: 60 days

- **Blood cultures**
  Remove the following: An exception is the investigation for mycobacteria (see Mycobacteriology section).

- **Brain Examination (Post mortem)**
  Amended TAT to 12 weeks

- **Cerebrospinal fluid (CSF): 14-3-3 and S100**
  Samples referred to Edinburgh for testing, no longer batched. Dispatched on receipt.

- **Cerebrospinal fluid (CSF): Culture and Microscopy**
  New reference ranges for CSF WBC updated

- **Ceruloplasmin**
  Changed Ceruloplasmin ref range to: 0.14-0.25 g/L

- **Chlamydia Trachomatis**
  Added to comments section, Flocked swabs are suitable only for Endocervical samples (this is the thinner of the 2 swabs in the sample collection kit). Use woven swabs provided for all other sites.

- **CLL Prognostic Markers (TP53 and IGVH mutation status)**
  Turn around time: 60 days

- **Carbapenamase Producing Enterobacteriales**
  CPE rectal swab for culture: Remove the following: Specimens are only processed where there is prior agreement with the Consultant Microbiologist or the Infection Control Team.

- **Carbapenamase Producing Enterobacteriales PCR**
  New section added, to section 13, test directory for CPE screening by PCR.

- **CRP**
  Changed CRP ref range to 0.0-5.0mg/L

- **Cytotoxic Antibodies**
  Now included as referred by Blood Transfusion Laboratory.

- **EGFR (cfDNA Plasma)**
  Added: EGFR cfDNA Plasma Molecular testing in the pathology laboratory CUH is performed on request from
Consultant Histopathologists on plasma samples from patients with Lung cancer. The cut-off for receipt of these samples into the laboratory is 15:00 2 K2 EDTA Blood tubes Please contact the laboratory prior to taking the sample at Ext.22513 /22792 Deliver to the molecular pathology laboratory and hand directly to the Medical Scientist.

<table>
<thead>
<tr>
<th>Test</th>
<th>Turnaround time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erythrocyte Membrane Analysis EMA for Hereditary Spherocytosis</td>
<td>28 days</td>
</tr>
<tr>
<td>ESR</td>
<td>84 days</td>
</tr>
<tr>
<td>Factor VIII Chromogenic</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Faecal Elastase</td>
<td></td>
</tr>
<tr>
<td>Fibrinogen Phenotyping and Genetic Analysis</td>
<td>64 days</td>
</tr>
<tr>
<td>Flow Cytometry</td>
<td></td>
</tr>
<tr>
<td>Foetal DNA Rh D Typing</td>
<td></td>
</tr>
<tr>
<td>Foetal Maternal Haemorrhage FMH by Flow Cytometry &gt; 2.5mls bleed</td>
<td>1-14 days for the hard copy report: It is practice of the referral laboratory to give a verbal report as soon as possible.</td>
</tr>
<tr>
<td>Free T3</td>
<td>2.9 - 4.9 pmol/L.</td>
</tr>
<tr>
<td>Frozen Sections</td>
<td></td>
</tr>
<tr>
<td>GATA Mutational analysis</td>
<td>64 days</td>
</tr>
<tr>
<td>HCG</td>
<td></td>
</tr>
<tr>
<td>HLA Typing</td>
<td></td>
</tr>
<tr>
<td>JAK2 Exon 12 mutation</td>
<td>64 days</td>
</tr>
<tr>
<td>MTHFR</td>
<td>32 days</td>
</tr>
<tr>
<td>MTHFR and PAI- mutation assays</td>
<td></td>
</tr>
<tr>
<td>Mutation analysis</td>
<td>95 days but may vary depending on gene</td>
</tr>
<tr>
<td>Mycobacteria testing</td>
<td></td>
</tr>
<tr>
<td>Mycoplasma pneumoniae IgM</td>
<td></td>
</tr>
<tr>
<td>Osmolality</td>
<td></td>
</tr>
</tbody>
</table>

Updated laboratory details.

- Erythrocyte Membrane Analysis EMA for Hereditary Spherocytosis
- ESR
- Factor VIII Chromogenic
- Faecal Elastase
- Fibrinogen Phenotyping and Genetic Analysis
- Flow Cytometry
- Foetal DNA Rh D Typing
- Foetal Maternal Haemorrhage FMH by Flow Cytometry > 2.5mls bleed
- Free T3
- Frozen Sections
- GATA Mutational analysis
- HCG
- HLA Typing
- JAK2 Exon 12 mutation
- MTHFR (Methylenetetrahydrofolate Reductase) C667T Mutation
- MTHFR and PAI- mutation assays
- Mutation analysis for inherited bleeding disorders, Haemophilia carrier testing for direct mutational detection, mutation analysis for inherited Factor VIII or Factor IX deficiency
- Mycobacteria testing
- Mycoplasma pneumoniae IgM
- Osmolality

Changes: Mon –Fri 8am to 4:30pm
• the case must be discussed with a pathologist (after 5.30 the case must be discussed with the pathologist on-call who may be contacted through the hospital switchboard).
• The form must have a red Frozen sticker attached.

More clearly described HLA typing options available (e.g. B27, Disease Association, Solid Organ Transplant)

The following samples aer processed only after prior consultation with Microbiology Medical Team: Urine, Blood culture, gastric lavage.
Gastric lavage samples must not be ordered through iCM.
Gastric lavage samples must be accompanied by a Green Microbiology form.

Test now performed by NVRL, Dublin. Turnaround time adjusted to 5 days from 36 hours.
<table>
<thead>
<tr>
<th>Test/Diagnosis</th>
<th>Turnaround Time/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyruvate Kinase</td>
<td>Turn around time: 60 days</td>
</tr>
<tr>
<td>PAI-1 (Plasminogen Activator Inhibitor)</td>
<td>Turn around time: 40 days</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Removed Therapeutic range</td>
</tr>
<tr>
<td>Protein S</td>
<td>Correct reference interval is 68% - 139%</td>
</tr>
<tr>
<td>Parasitology (enteric) – Ova, Cysts and Parasites (OCPs)</td>
<td>Remove line: Specimens will be processed only by prior arrangement with the laboratory. FMT (Faecal Microbiota Transplant) patients will be processed.</td>
</tr>
<tr>
<td>PF4</td>
<td>Correction: PF4 no longer needs Two Blood 3mL blue Vacuette® (sodium citrate 3.2%), Requirement is for: Two Blood 4mL red top Vacuette® (or similar container for clotted blood)</td>
</tr>
<tr>
<td>PNH</td>
<td>Turn around time: Positive results phoned within 24 hours of receipt of result, printed reports in 30 days</td>
</tr>
<tr>
<td>Quantiferon®-TB Gold Plus test (QFT)</td>
<td>Note:</td>
</tr>
<tr>
<td></td>
<td>• Fill to black mark on tube; under of overfilled bottles are not accepted. Immediately after filling tubes shake 10xtimes; just firmly enough to ensure the entire inner surface of the tube is coated with blood to dissolve antigens on tube walls.</td>
</tr>
<tr>
<td></td>
<td>• Hand-write patient details on tubes.</td>
</tr>
<tr>
<td></td>
<td>• Return the complete kit (in box) accompanied by a green Microbiology request form.</td>
</tr>
<tr>
<td></td>
<td>Comment: Specimens are only accepted by this laboratory Monday to Thursday before 2pm (excluding Bank Holidays).</td>
</tr>
<tr>
<td>Respiratory virus screen</td>
<td>Addition of extra viruses to the screen</td>
</tr>
<tr>
<td></td>
<td>Addition of rapid influenza A/B test when clinically indicated and when approved through medical microbiology team.</td>
</tr>
<tr>
<td>Rotavirus/Adenovirus assay</td>
<td>Changed 'Test on children &lt;3 years.' to 'Test performed on children &lt;5 years.'</td>
</tr>
<tr>
<td>Salicylate</td>
<td>Removed Therapeutic range</td>
</tr>
<tr>
<td>Stem cell enumeration (CD34) - New test added</td>
<td>Haematology CD34 – All requests must be discussed with the Immunophenotyping staff</td>
</tr>
<tr>
<td>Von-Willebrand Multimers / Collagen binding</td>
<td>Turn around time: 42 days / 64 days</td>
</tr>
<tr>
<td>VWF Cleaving Protease (vWFcp) Assay (ADAMTS13 Activity and Antibodies)</td>
<td>Turn around time: 60 days</td>
</tr>
<tr>
<td>Warfarin Plasma Resistance Concentration</td>
<td>Added: Super Warfarin (rodenticides) Vitamin K1 and PIVKA 11 are part of this profile reported and may be requested, turnaround time 28 days</td>
</tr>
<tr>
<td>Whipples</td>
<td>Test now performed by Department of Microbiology, Leeds General Infirmary.</td>
</tr>
<tr>
<td>14 Glossary of Abbreviations</td>
<td>Added Carbapenemase Producing Enterobacterales (CPE)</td>
</tr>
<tr>
<td>15 Names / addresses of referral labs</td>
<td>Added National CPE Reference Laboratory, Galway University Hospital to the list.</td>
</tr>
<tr>
<td></td>
<td>Added Department of Microbiology, Old Medical School, Leeds General Infirmary, Thoresby Place, Leeds LS1 3EX, England.</td>
</tr>
<tr>
<td></td>
<td>Changed Biomnis to Eurofins-Biomnis and changed link to website to <a href="https://www.eurofins.ie/biomnis/">https://www.eurofins.ie/biomnis/</a> (Biochemistry)</td>
</tr>
<tr>
<td></td>
<td>- Changed Biomnis to Eurofins-Biomnis (Haematology)</td>
</tr>
<tr>
<td>21 7.2.1</td>
<td>Moved clinical information from essential information to desirable information</td>
</tr>
</tbody>
</table>
3 INTRODUCTION

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

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

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

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

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

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

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

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

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

4.1 The location of the laboratory

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

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

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

<table>
<thead>
<tr>
<th>Department /Section</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Blood Transfusion</td>
<td>Ground floor, Laboratory building</td>
</tr>
<tr>
<td>2. Clinical Biochemistry</td>
<td>Ground floor, Laboratory building.</td>
</tr>
<tr>
<td>Molecular Genetics</td>
<td>Ground floor on the link corridor between outpatients and laboratory reception</td>
</tr>
<tr>
<td>3. Clinical Microbiology</td>
<td>First floor, Laboratory building</td>
</tr>
<tr>
<td>Infectious Diseases Serology</td>
<td>Located on the ground floor, opposite Physiotherapy department.</td>
</tr>
<tr>
<td>4. Haematology and Coagulation</td>
<td>Ground floor, Laboratory building</td>
</tr>
<tr>
<td>Haematinics</td>
<td>Ground floor, by outpatients</td>
</tr>
<tr>
<td>Molecular Genetics</td>
<td>Ground floor on the link corridor between outpatients and laboratory reception</td>
</tr>
<tr>
<td>5. Pathology</td>
<td>First Floor, Laboratory building (Swipe access only)*</td>
</tr>
<tr>
<td>Histopathology</td>
<td>First Floor, Laboratory building (Adjacent to Theatre 9)</td>
</tr>
<tr>
<td>Cytopathology</td>
<td>Ground Floor, Laboratory building adjacent to Biochemistry</td>
</tr>
<tr>
<td>Electron Microscopy /Renal</td>
<td>Ground floor on the link corridor between outpatients and laboratory reception</td>
</tr>
<tr>
<td>Post Mortem</td>
<td></td>
</tr>
<tr>
<td>Neuropathology</td>
<td></td>
</tr>
<tr>
<td>6. Autoimmune Serology</td>
<td>Autoimmune Serology shares the ground floor of the Laboratory building with the Haematology and Biochemistry Departments.</td>
</tr>
</tbody>
</table>

*It is advisable that external couriers have contact numbers for laboratories, as laboratories are swipe access only.
4.2 Opening Hours and Laboratory Telephone Extension Numbers

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

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

<table>
<thead>
<tr>
<th>Blood Transfusion</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Transfusion Laboratory</td>
<td>Ext. 22537</td>
<td>08:00-20:00 Mon-Fri</td>
<td>17:00 (Mon-Fri)</td>
</tr>
<tr>
<td>Antenatal Section of Laboratory</td>
<td>Ext: 22668</td>
<td>09:00-12:00 Sat</td>
<td>09:30 (Sat)</td>
</tr>
<tr>
<td>Blood Transfusion Laboratory Fax Number:</td>
<td>(021) 4922004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientist On-call</td>
<td>Bleep:199</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Biochemistry</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Biochemistry</td>
<td>Ext. 22528</td>
<td>08:00-20.00 Mon-Fri</td>
<td>16:30 Mon-Fri</td>
</tr>
<tr>
<td>Endocrinology / Tumour Markers</td>
<td>Ext. 22528</td>
<td>Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section “On-Call Tests”. Non urgent specimens will be stored at 4°C and processed the next working day.</td>
<td></td>
</tr>
<tr>
<td>Molecular Genetics</td>
<td>Ext. 22361 /22531</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapeutic Drug Monitoring (TDM)</td>
<td>Ext. 22528</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Proteins / Immunology</td>
<td>Ext. 22535</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientist on call</td>
<td>Bleep: 253</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Haematology and Coagulation</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerical Office -Results/Enquiries</td>
<td>Ext. 22541</td>
<td>Routine hours are defined as 09:00 to 17:00, except for the following tests FBC and routine Coagulation which are analysed between 08:00 to 20:00 Mon-Fri, and 09:00 to 12:00 Sat</td>
<td>16:30 Mon-Fri</td>
</tr>
<tr>
<td>12 :00 Sat</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Main Laboratory

**Haematinics**  
**Specimen reception**

<table>
<thead>
<tr>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ext. 20172</td>
<td>08:00-18:00 Mon-Fri</td>
<td>16:30 Mon-Fri</td>
</tr>
<tr>
<td>Ext. 22128</td>
<td>09:00-12:00 Sat</td>
<td>Fixed &amp; unfixed specimens</td>
</tr>
<tr>
<td>Ext. 22547</td>
<td>08:00-18:00 Mon-Fri</td>
<td>11:45 Sat.</td>
</tr>
</tbody>
</table>

Only emergency samples will be processed during the out-of-hours service. A detailed list of on-call tests is outlined in the section “On-Call Tests”. Non urgent specimens will be stored and processed the next working day.

**Medical Scientist on call (Haematology):**

<table>
<thead>
<tr>
<th>Bleep: 377</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am-5pm Mon Fri</td>
<td>4.30pm</td>
<td></td>
</tr>
</tbody>
</table>

Non urgent specimens will be stored and processed the next working day.

### Pathology

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Histopathology (Laboratory)</strong></td>
<td>Ext: 22792</td>
<td>08:00-18:00 Mon-Fri</td>
<td>16:30 Mon-Fri</td>
</tr>
<tr>
<td>Secretariat</td>
<td>Ext: 22514</td>
<td>09:00-12:00 Sat</td>
<td>Fixed &amp; unfixed specimens</td>
</tr>
<tr>
<td></td>
<td>/ 22510</td>
<td>08:00-18:00 Mon-Fri</td>
<td>11:45 Sat.</td>
</tr>
<tr>
<td><strong>Cytopathology</strong></td>
<td>Ext. 22511</td>
<td>9am-5pm Mon Fri</td>
<td></td>
</tr>
<tr>
<td><strong>Specimen Reception</strong></td>
<td>Ext. 22792</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consultant Pathologist/ clerical office</strong></td>
<td>Ext. 22514/22510</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post Mortem/Mortuary Services</strong></td>
<td>Ext. 22525/22883</td>
<td>24 hour service</td>
<td>11am cut-off</td>
</tr>
<tr>
<td><strong>Renal Pathology/ Electron Microscopy</strong></td>
<td>Ext 21315</td>
<td>08:00-16:00 Mon-Fri</td>
<td>Mon – Fri 8am to 15:30pm</td>
</tr>
</tbody>
</table>

Out of hours contact Pathologist on call via switch.

**Neuropathology Office**  
Ext 22520  
09:00-17:00 Mon-Fri  
16:00 Mon-Fri

**Neuropathology Laboratory**  
Ext 22519  
No service on Sat  
16:00 Mon-Fri

**Mobile for Consultant Neuropathologist on call:** Contact CUH switchboard

<table>
<thead>
<tr>
<th>Immunology</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autoimmune Serology</strong></td>
<td>Ext. 22535</td>
<td>08:00-17:00 Mon-Fri</td>
<td>16:30 Mon-Fri</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No service on Sat</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory Medicine Information Systems Helpdesk</th>
<th>Contact No</th>
<th>Opening Hours</th>
<th>Sample Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:cuhit.pathology@hse.ie">cuhit.pathology@hse.ie</a></td>
<td>Ext. 20150</td>
<td>09:00-17:00 Mon-Fri</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No service on Sat</td>
<td></td>
</tr>
</tbody>
</table>
# 4.3 Contact Details

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Tel Ext.</th>
<th>E. mail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Laboratory Medicine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ms Sinead Creagh</td>
<td>Laboratory Manager (interim)</td>
<td>22532</td>
<td><a href="mailto:sinead.creagh@hse.ie">sinead.creagh@hse.ie</a></td>
</tr>
<tr>
<td>Mr Paul Cantwell</td>
<td>Laboratory Quality Manager</td>
<td>20089</td>
<td><a href="mailto:paul.Cantwell@hse.ie">paul.Cantwell@hse.ie</a></td>
</tr>
<tr>
<td>Ms Brid O'Mahony</td>
<td>Laboratory Information Systems Leader</td>
<td>20150</td>
<td><a href="mailto:brid.OMahony1@hse.ie">brid.OMahony1@hse.ie</a></td>
</tr>
<tr>
<td><strong>Department of Blood Transfusion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr Oonagh Gilligan</td>
<td>Consultant Haematologist</td>
<td>20111</td>
<td><a href="mailto:Oonagh.Gilligan@hse.ie">Oonagh.Gilligan@hse.ie</a></td>
</tr>
<tr>
<td>Dr Mary Cahill</td>
<td>Consultant Haematologist</td>
<td>22546</td>
<td><a href="mailto:MaryR.Cahill@hse.ie">MaryR.Cahill@hse.ie</a></td>
</tr>
<tr>
<td>Dr Cleona Duggan</td>
<td>Consultant Haematologist</td>
<td>22545</td>
<td><a href="mailto:Cleona.Duggan@hse.ie">Cleona.Duggan@hse.ie</a></td>
</tr>
<tr>
<td>Dr Susan O'Shea</td>
<td>Consultant Haematologist</td>
<td>22545</td>
<td><a href="mailto:Susan.OShea@hse.ie">Susan.OShea@hse.ie</a></td>
</tr>
<tr>
<td>Dr Derville O'Shea</td>
<td>Consultant Haematologist</td>
<td>22548</td>
<td><a href="mailto:Derville.OShea@hse.ie">Derville.OShea@hse.ie</a></td>
</tr>
<tr>
<td>Dr Vitaliy Mykytiv</td>
<td>Consultant Haematologist</td>
<td>20111</td>
<td><a href="mailto:Vitaliy.Mykytiv@hse.ie">Vitaliy.Mykytiv@hse.ie</a></td>
</tr>
<tr>
<td>Mr John Sheehy</td>
<td>Chief Medical Scientist</td>
<td>20346</td>
<td><a href="mailto:John.Sheehy@hse.ie">John.Sheehy@hse.ie</a></td>
</tr>
<tr>
<td>Ms Brid Doyle</td>
<td>Specialist Medical Scientist: Haemovigilance Co-ordinator</td>
<td>22668</td>
<td><a href="mailto:Brid.doyle@hse.ie">Brid.doyle@hse.ie</a></td>
</tr>
<tr>
<td>Greg O'Connor</td>
<td>Haemovigilance Officer (CUH)</td>
<td>086 0453551</td>
<td><a href="mailto:Greg.OConnor@hse.ie">Greg.OConnor@hse.ie</a></td>
</tr>
<tr>
<td>Deirdre Harrington</td>
<td>Haemovigilance Officer (CUH)</td>
<td>086 0453551</td>
<td><a href="mailto:Deirdre.Harrington@hse.ie">Deirdre.Harrington@hse.ie</a></td>
</tr>
<tr>
<td>Ms Connie Foley</td>
<td>Haemovigilance Midwife (CUMH)</td>
<td>086 7872160</td>
<td><a href="mailto:Connie.Foley@hse.ie">Connie.Foley@hse.ie</a></td>
</tr>
<tr>
<td>Ms Patricia O’Leary</td>
<td>Haemovigilance Midwife (CUMH)</td>
<td>086 7872163</td>
<td><a href="mailto:Patricia.OLeary@hse.ie">Patricia.OLeary@hse.ie</a></td>
</tr>
<tr>
<td><strong>Medical Scientist on call in Blood Bank: Bleep No:</strong></td>
<td></td>
<td>199</td>
<td></td>
</tr>
<tr>
<td><strong>Department of Clinical Biochemistry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr Sean Costello</td>
<td>Consultant Clinical Biochemist</td>
<td>22530</td>
<td><a href="mailto:Sean.Costelloe@hse.ie">Sean.Costelloe@hse.ie</a></td>
</tr>
<tr>
<td>Ms Ruth Shields</td>
<td>Chief Medical Scientist</td>
<td>22809</td>
<td><a href="mailto:Ruth.shields@hse.ie">Ruth.shields@hse.ie</a></td>
</tr>
<tr>
<td>Mr Mark Butler</td>
<td>Chief Medical Scientist</td>
<td>22809</td>
<td><a href="mailto:Mark.Butler@hse.ie">Mark.Butler@hse.ie</a></td>
</tr>
<tr>
<td>Ms Katherine Hooley</td>
<td>Chief Medical Scientist</td>
<td>22534</td>
<td><a href="mailto:Katherine.hooley@hse.ie">Katherine.hooley@hse.ie</a></td>
</tr>
<tr>
<td>Ms Caroline Joyce</td>
<td>Principal Clinical Biochemist</td>
<td>22531</td>
<td><a href="mailto:caroline.joyce@hse.ie">caroline.joyce@hse.ie</a></td>
</tr>
<tr>
<td><strong>Department of Clinical Microbiology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr Dan Corcoran</td>
<td>Consultant Microbiologist</td>
<td>20120</td>
<td><a href="mailto:Dan.Corcoran@hse.ie">Dan.Corcoran@hse.ie</a></td>
</tr>
<tr>
<td>Prof Michael Prentice</td>
<td>Consultant Microbiologist</td>
<td>4901246</td>
<td><a href="mailto:michael.prentice@hse.ie">michael.prentice@hse.ie</a></td>
</tr>
<tr>
<td><strong>N.C.H.D.s Microbiology Registrars / SHO</strong></td>
<td></td>
<td>22504 /22694</td>
<td></td>
</tr>
<tr>
<td>Ms Louise Barry</td>
<td>Chief Medical Scientist</td>
<td>22502</td>
<td><a href="mailto:Louise.barry1@hse.ie">Louise.barry1@hse.ie</a></td>
</tr>
<tr>
<td>Dr Declan Spillane</td>
<td>Chief Medical Scientist (Infectious Diseases Serology)</td>
<td>22506</td>
<td><a href="mailto:Declan.Spillane@hse.ie">Declan.Spillane@hse.ie</a></td>
</tr>
<tr>
<td><strong>Department of Haematology and Coagulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ms Carmel Hooton</td>
<td>Surveillance Scientist (Interim)</td>
<td>20089</td>
<td><a href="mailto:Carmel.hooton@hse.ie">Carmel.hooton@hse.ie</a></td>
</tr>
<tr>
<td><strong>Medical Scientist on call Bleep No:</strong></td>
<td></td>
<td>375</td>
<td></td>
</tr>
<tr>
<td><strong>Department of Haematology and Coagulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Name | Position | Tel Ext. | E. mail
---|---|---|---
Ms Mary F. Ring | Chief Medical Scientist | 22544 | MaryF.Ring@hse.ie
Dr Norma Reidy | Chief Medical Scientist | 22544 | Norma.reidy@hse.ie
Mr Damien Hennessy | Chief Medical Scientist (Cryobiology) | 21351 | Damien.Hennessy@hse.ie
Nelia Andrade | Senior Phlebotomist | 22415 | Nelia.andrade@hse.ie
Medical Scientist on call | | | 377

#### Department of Immunology

Katherine Hooley | Chief Medical Scientist | 22535 | Katherine.Hooley@hse.ie

#### Department of Pathology

Dr Louise Burke | Consultant Histopathologist | 22127 | louise.burke@hse.ie
Dr Linda Feeley | Consultant Histopathologist | 20468 | linda.feeley@hse.ie
Dr John Hogan | Consultant Histopathologist | 22522 | johnm.hogan@hse.ie
Dr Tara Jane Browne | Consultant Cyto/Histopathologist | 20087 | tarajane.browne@hse.ie
Dr Mary Hayes | Consultant Cyto/Histopathologist | 22886 | mary.hayes4@hse.ie
Dr Michael W. Bennett | BreastCheck Consultant Histopathologist | 20496 | michael.bennett@hse.ie
Dr Julie McCarthy | Consultant Cytopathologist | 20499 | julie.mccarthy@hse.ie
Dr Fionnuala O'Connell | Consultant Histopathologist | 22509 | fionnuala.oconnell@hse.ie
Dr James Fitzgibbon | Consultant Histopathologist | 20487 | james.fitzgibbon@hse.ie
Dr Nick Mayer | Consultant Histopathologist | 20488 | nick.mayer@hse.ie
Dr Cynthia Heffron | Consultant Histopathologist | 20485 | cynthia.heffron@hse.ie
Dr Brendan Fitzgerald | Consultant Histopathologist | 20135 | brendan.fitzgerald@hse.ie
Dr Brian Hayes | Consultant Histopathologist | 22523 | Brian.Hayes@hse.ie
Dr Niamh Conlon | Consultant Histopathologist | 22454 | Niamh.Conlon1@hse.ie
Dr Susan Prendeville | Consultant Histopathologist | 22589 | Susan.Prendeville@hse.ie
Ms Brid Brew | Chief Medical Scientist, Pathology | 22572 | Brid.Brew@hse.ie
Ms Réiltín Werner | Chief Medical Scientist, Pathology | 22513 | Reiltin.Werner@hse.ie
Ms Marian Buckley | Chief Medical Scientist, Pathology | 22513 | Marian.Buckley@hse.ie
Mr Dan Collins | Mortuary Services Manager | 22525/22524 |
Mr Kevin Lynch | Senior Anatomical Pathology Technician | | kevin.lynch@hse.ie

#### Neuropathology

Dr Niamh Bermingham | Consultant Neuropathologist | 20474 | niamh.bermingham@hse.ie
Dr Michael Jansen | Consultant Neuropathologist | 20475 | Michael.jansen@hse.ie

An urgent on call service is provided weekdays from 9.00 am Monday to 5.00 pm Friday and a limited on call at certain weekends only. For Neuropathologist on call rota and mobile contact nos. please check with Hospital Switchboard.
4.4 Availability of clinical advice on ordering of examinations and on interpretation of results

1. Clinical advice on ordering of examinations and on interpretation of examination results is available and can be obtained by contacting the appropriate clinical team (refer to section 4.3).
2. Interpretation and clinical advice is provided on the report where appropriate.
3. Refer to section 5.0 for further information regarding the ordering of examinations.
4. Refer to the A-Z Test Directory for a list of tests performed, samples required, primary sample volumes, special precautions, turnaround time, biological reference intervals, and clinical decision values.
5. Haematology Virtual Clinic provides a service to referring GP’s, outpatient clinics, other CUH medical/surgical departments and outside hospitals whereby they receive advice and helpful guidelines from the Consultant Haematologists. The main purpose of this service is to save patients unnecessary trips to the haematology outpatient clinics which are already heavily overbooked. It allows GP’s etc to follow up and treat their patients in the community as a result of the advice they receive from the haematology consultants.

4.5 The laboratory's complaint procedure

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

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

- [https://www.hse.ie/eng/about/qavd/complaints/officers/hospital/](https://www.hse.ie/eng/about/qavd/complaints/officers/hospital/)
- HSE policy and procedures for 'The Management of Consumer Feedback to include Comments, Compliments and Complaints in the Health Service Executive' can be accessed through the HSE website or by clicking on the following link:

- [https://www.hse.ie/eng/services/yourhealthservice/feedback/complaints/policy/](https://www.hse.ie/eng/services/yourhealthservice/feedback/complaints/policy/)

4.6 Policy on protection of personal information

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

- obtained fairly
- recorded correctly, kept accurate and up-to-date
- used and shared both appropriately and legally
- stored securely
- not disclosed to unauthorised third parties
- disposed of appropriately when no longer required
All staff working in the HSE are legally required under the Data Protection Act 2018 to ensure the security and confidentiality of all personal data they collect and process on behalf of service users and employees. Data Protection rights apply whether the personal data is held in electronic format or in a manual or paper based form.

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

### 4.7 Instructions for transportation of samples, including any special handling needs

Instructions for the transport of specimens to the Laboratory are described in a separate procedure for Sample Transportation: PPG-CUH-PAT-36.

**NOTE:** All Urgent Biochemistry samples should be brought directly to the Biochemistry Laboratory and handed directly to a member of staff. Urgent samples from GP’s should be sent in the bag specifically labelled ‘Biochemistry Urgent Samples’ to allow for prompt processing. A supply of labelled bags is available from Biochemistry.

Please contact the laboratory for information on the correct procedure for centrifugation and specimen storage prior to transport to the laboratory.

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

Samples for specialised coagulation must arrive into the laboratory within 4 hours of phlebotomy.
5 TYPES OF CLINICAL SERVICES OFFERED BY THE LABORATORY

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

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

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

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

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

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

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

Information regarding in-house and referred tests is available in the Test Directory.
Services offered include:
- Routine Clinical Biochemistry e.g. liver, renal, cardiac, bone, glucose
- Lipids, e.g. cholesterol, triglycerides, lipoproteins
- Endocrinology, e.g. thyroid function, infertility testing, pituitary disorders
• Specific proteins, e.g. immunoglobulins, allergies, acute phase proteins
• Therapeutic drugs
• Cardiac markers
• Toxicology
• Molecular Genetics, e.g. Haemochromatosis

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

For advice on molecular genetic investigations, contact Principal Biochemist (ext 22531).

5.3 Department of Clinical Microbiology

Clinical services offered (including examinations referred to other laboratories)

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

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

Information regarding in-house and referred tests is available in the Test Directory.

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

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

General collection and transport guidelines:
1. Where possible, collect the specimen prior to the administration of antimicrobial therapy.
2. Collect the specimen with as little contamination from indigenous microbial flora as possible to ensure that the specimen will be representative of the infective site.
3. Collect the specimen using sterile equipment and aseptic technique to prevent the introduction of contaminating micro-organisms.
4. Collect an adequate amount of the specimen. Insufficient specimens may yield false-negative results.
5. Most specimens collected with a swab and transported dry are unacceptable.
6. Identify the specimen source and/or specific site correctly so that proper culture media will be selected during processing in the laboratory. Special requests such as Diphtheria, Actinomyces, Nocardia etc. should be noted on the microbiology request form.
7. Specimens should be transported as soon as possible.
8. If processing is delayed, refrigeration is preferable to storage at ambient temperature, with the following exceptions:
   - Blood cultures – hold specimen at room temperature
   - CSF – hold specimen at room temperature – do not transport through pneumatic tube system
   - Specimens for the detection of gonococci (keep GC specimens at room temperature)
   - Mycology specimens
9. Microbial cultures submitted by other laboratories for further identification should be submitted in pure culture on the appropriate medium in a sealed, screw-capped slope. Petri plates are acceptable if properly sealed for immediate transport.
10. Include foreign travel stating country as certain diseases/infections are associated with certain parts of the world.

   **Note:** Telephone the laboratory if the proper procedure is in doubt.

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

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

As well as providing the diagnostic services provided, education and training are an integral part of the daily routine within the laboratory with established links to the Medical
and Science faculties at UCC and the Biological Sciences department of the Cork Institute of Technology (CIT). Members of staff regularly teach at both institutions. In addition an Irish Committee of Higher Medical Training/Royal College of Pathologists approved structured training programme for Non Consultant Hospital Doctors (NCHDs) is well established within the laboratory as are trainee medical scientist programmes approved by the Academy of Medical Laboratory Science. The laboratory is also involved in both intradepartmental and collaborative research.

Information regarding in-house and referred tests is available in the Test Directory.

Services offered include:

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

   ESR

2. Coagulation
   - PT and INR to monitor Warfarin and Di-coumarin therapy
   - APTT to monitor intravenous Heparin therapy and the investigation of inherited
     and acquired bleeding.
   - Routine Screen for investigation of bleeding disorders: INR, APTT, Fibrinogen and
     Platelet Count. In the event of abnormal results occurring in the Intrinsic or
     Extrinsic Pathways the relevant Factor deficiencies are investigated including
     screens for Von Willebrand’s disease and Inhibitor screens
   - Anti-Factor Xa to monitor Low Molecular Weight Heparin therapy
   - Platelet function abnormalities are investigated by performing Platelet Function
     Tests.
   - Thrombophilia Screen: Appropriate ordering for Thrombophilia for the investigation
     of thrombotic episodes must be 6 weeks post thrombotic episode. Patients on
     anticoagulants are not suitable for Thrombophilia screening, see BCSH Guidelines.
   - Lupus Anticoagulant screen: PT, APTT, Fibrinogen assay, AFSL, and DVVT

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

3. Thrombophilia
   Indications: Check BCSH guidelines published December 2010 to prevent unnecessary
   testing of patients, copy and paste following link to browser for guidelines:

4. Bone marrow investigations
   Bone marrow examinations are undertaken when investigating patients for
   Leukaemia, Lymphoma, Myeloma, Myelofibrosis and Platelet abnormalities e.g.
   Thrombocytopenia / Thrombocytosis.
   Bone Marrow investigations for add on tests: contact Haematology Laboratory.
5. Flow Cytometry
Flow cytometry is used in the diagnosis and classification of acute leukaemia, chronic lymphoid leukaemia and Non-Hodgkin's lymphoma. The technique employs fluorochrome-labelled monoclonal antibodies directed against specific cellular antigens. Abnormal cell populations are characterised by multiparameter analysis, using forward light scatter, side scatter and fluorescence signals to classify /identify each cell type (immunophenotype). Other applications of this technique include immune monitoring and lymphocyte subset analysis, e.g. CD4 count for HIV.

6. Haematoclinic Assays
Haematoclinic studies consist of serum B12, Folate and Ferritin assays. Vitamin B12 and Folate assays are carried out in the investigation of macrocytic anaemias. B12, Folate and Ferritin should be requested for investigation of abnormal FBC results and relevant clinical syndromes. Use of haematoclinics for screening of well patients is not recommended. Requests should be accompanied by clinical details. When B12 results are low Intrinsic Factor Antibody investigation is carried out. Serum Ferritin assays are performed when microcytic hypochromic anaemia is suspected, or cases of suspected Haemachromatosis. See BCSH guidelines.

The diagnosis of B12 and folate deficiency
N.B. Interference in these assays may occur in patients receiving or having diagnostic procedures utilizing monoclonal antibodies.

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

Determined using HPLC / Electrophoresis Technologies
Glycosylated Haemoglobin assays are used in monitoring diabetic patients as the levels reflect time-averaged blood glucose levels. HbA1c is an objective test of metabolic control, which is independent of the patient’s cooperation, the time of day, insulin administration, meals, or exercise and provides the physician with an unbiased indication of the efficacy of prescribed therapy.

8. Autologous Stem Cell Storage and Reinfusion:
This is a clinical Haematology service used in the treatment of patients with Leukaemia, Lymphoma, and Myeloma. For further information contact the Consultant Haematologist.

Emergency Specimens
Laboratory must be informed of specimens which are emergencies and they will be processed within time frame stated for emergencies for each test.
Examinations referred to other laboratories:
Test information is included in the test directory.

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

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

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

Coroner’s Autopsies
The following types of death must be reported to the Coroner.
- Where the death may have resulted from an accident, suicide or homicide.
- Where any question of misadventure arises in relation to the clinical or pharmaceutical treatment of the deceased.
- Where a patient dies before a clinical diagnosis is made.
- Where a patient dies within 24 hours of admission to hospital.
- Where the death occurred while a patient was undergoing an operation, or was under the effect of an anaesthetic, or following an operation.
- Where the death occurred during, or as a result of, any procedure.
- Where the death resulted from any industrial disease.
- Where the death was due to neglect or lack of care (including self-neglect)
- Where the death occurred due to hospital service acquired infection

Do not ask the next of kin for consent to perform an autopsy examination if any of the above circumstances apply. If you have any doubt as to whether or not a death is properly reportable, consult with the Coroner who will advise accordingly. The fact that a death is reported to the Coroner does not mean that an autopsy will always be required. The Cork City Coroner (Dr. Myra Cullinane) phone number is 086-2941446.

Cremation
If the family wishes to have the body cremated, the arrangements must be made by them through the Funeral Director/Anatomical Pathology Technician. The Funeral Director/Anatomical Pathology Technician will liaise with the appropriate doctor who will complete the Medical Certificate Form (Form C).
Alternatively, if the death is a Coroner’s case, Form D will be completed by the Coroner. It is the policy of Cork University Hospital to refer all documents relating to cremation to the Coroners office for completion. Cardiac pacemakers and/or any radioactive implant
must be removed prior to a cremation (and, if appropriate, this action notified to the Coroner).

**Request / Hospital autopsies**

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

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

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

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

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

**Perinatal Autopsy Examination**

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

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

**Neuropathology**

Neuropathology provides a Consultant -provided quality diagnostic service mainly to Cork University Hospital for Neurosurgery, Neurology and Specialised Ophthalmology, outside referrals for approximately ⅓ of the country including all of the Cork hospitals, Tralee and Bantry and referrals from Limerick.
The following information is designed to help you use the Department:
Investigations: These include neurosurgical biopsies, neuromuscular biopsies, temporal artery biopsies, ophthalmic biopsies, CSF for Cytology, CSF for S100 and 14-3-3 protein, and blood for antineuronal antibodies. For advice regarding investigations contact the Consultant Neuropathologist ext 22520.

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

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

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

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

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

5.6 Point of Care Testing
Blood gas analysers and glucose meters situated outside the laboratory give high quality results if used and maintained correctly. Do NOT use this equipment unless you have been trained. Training courses are organised periodically by the Clinical Biochemistry Laboratory. Follow the instructions for the disposal of waste in order to minimise health, safety and cross infection risks.
1. Blood Gas Analysers - Blood Gas Analysers are located in Intensive Care (General and Cardiac), Theatre, CUMH Neo Natal Units and Labour Wards.
2. Blood Glucose Meters - Blood Glucose Meters are located throughout the Hospital to monitor known diabetics. These are not to be used for the diagnosis of diabetes mellitus, for which a blood specimen must be sent to the laboratory.
6 INSTRUCTIONS FOR PATIENT-COLLECTED SAMPLES

6.1 Faeces / Stool Sample Collection

1. Specimen containers are available from the clinical area or general practitioner. Faeces /stool specimens are submitted for microbiology from patients with diarrhoea or stomach upset. Sometimes, a stool is sent on a person that has had close contact with a person that has had diarrhoea.

2. The container should be labelled with your full name, date of birth (or your Hospital Chart number if you have it), date / time of collection and the sample type, i.e. Faeces.

3. The sterile container should not be opened until you are ready to collect the sample.

4. Wash and dry your hands.

5. Do not submit faeces contaminated with urine or toilet water. Urinate into the toilet if needed.

6. Place plenty of lavatory paper in a clean potty or in the lavatory pan. Make sure there is no trace of disinfectant or bleach present, as this will interfere with the test. Faeces (a bowel movement) should then be passed on to the toilet paper. Do not send stool wrapped in toilet paper to the laboratory.

7. Note: If you have severe diarrhoea or a watery stool, a potty may be needed to collect the initial sample.

8. Open the container and, using the ‘spoon’ that is provided, transfer enough stool in order to fill approximately 1/3 of the container. Do not overfill the container. Also please ensure that the outside of the container is not soiled with stool.

9. You should ensure that the lid of the container is firmly closed. Note that a leaking container may be infectious. Place the container into the specimen bag and attach to the laboratory request form.

10. Flush away the remaining paper and faeces down the lavatory.

11. Wash and dry hands thoroughly with soap and warm water.

12. Specimens should be brought to the laboratory as soon as possible.

6.2 Mid Stream Urine (MSU) Collection

1. Specimen containers are available from the clinical area or general practitioner.

2. The aim of collecting a mid stream urine sample is to help the doctor decide if you have a urinary tract infection (UTI or “kidney infection”). A ‘mid-stream’ sample is the best sample as the first urine you pass may be contaminated with bacteria from the skin.

3. The container should be labelled with your full name, date of birth (or your Hospital Chart Number if you have it), date / time of collection and the sample type, i.e. MSU.

4. The sterile container should not be opened until you are ready to collect the sample.

5. Prior to collection the genital area should be cleaned with tap water. Antiseptics should not be used. If the area is soiled, use soap and water and rinse thoroughly.

6. You should pass some urine into the toilet (discard the initial part of the urine sample); then without stopping the flow of urine, catch some urine in the sterile container (approximately half full). You should then finish passing urine
into the toilet. Some specimen bottles contain boric acid preservative (red top container with white powder in it). Do not discard the white powder. Fill boric acid container to the line marked, close the lid and mix well. This gives the correct concentration of preservative. Do not use urinary dipstick on boric acid samples as this leads to erroneous results.

7. You should ensure that the lid of the container is firmly closed and place the container into the specimen bag attached to the laboratory request form.

8. Specimens should ideally be brought to the doctor’s surgery or laboratory within 2 hours of collection. If that is not possible the sample should be refrigerated until it can be brought to the doctor’s surgery or laboratory.

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

### 6.3 24 hour collection of urine

#### Key Points;
- Ensure that you are provided with a collection bottle (brown container) for the 24 hour urine collection before you leave the hospital.
- All of the urine passed during the 24 hour period should be collected. Failure to collect all urine may invalidate result.
- An exact timing of the 24 hour period is required.
- Ensure container is labelled with patient’s full name, date of birth, date of collection and time collection was started and time collection was finished.
- Do not void urine directly into the 24 hour container but into a suitable clean detergent free container and then pour urine into the 24 hour container.
- If the container contains a preservative, please exercise care when adding urine to the 24 hour container avoiding splashing.
- Keep container away from children at all times.

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

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

### 6.4 Sputum Sample

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

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

6.5 HbA1c collection

1. Wash your hands and dry thoroughly
2. Increase the needle size of your testing pen by two markers
3. Remove the top from the PINK blood bottle
4. Prod your finger
5. Blood needs to be dripped into the bottle

6. Ensure SMALL label with all relevant details is stuck to the smaller PINK topped bottle
7. Place small bottle in the larger universal container (MSU bottle), then in specimen bag
8. Seal plastic bag and fill in all details on form provided
9. Place in a padded/well protected envelope
10. Post the specimen/deliver to: CODE UN 3773, Haematology Dept, Cork University Hospital

**Blood sample must be submitted at least 2 weeks before clinic visit**
7 ORDERING LABORATORY EXAMINATIONS

7.1 Instructions for completion of the request form

1. For accurate identification of patients and specimens, it is essential that request forms be completed fully, legibly and accurately. Please remember that inadequate information on request forms makes it impossible to issue a report to the correct location or contact the doctor in case of urgent or unexpected results.

2. The laboratory has a number of different request forms most of which are colour coded for the department. Multiple tests for one department can be sent on one request form but separate specimens and request forms are required if tests are being sent to a different department or where the sample types are different. Request forms are issued from Hospital Stores. Order supplies in advance to facilitate timely delivery.

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

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

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

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

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

The format of the labels should meet the following criteria.

The type size should be a **minimum of font size Arial 12** and follow the format:

**First name   Surname**

**Date of birth   Sex**

Patient address

***Space***

**Date and time of sample collection**

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

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

7.3 Criteria for accepting and rejecting samples

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

7.3.1 Biochemistry, Haematology, Microbiology, Pathology

<table>
<thead>
<tr>
<th>Request Form</th>
<th>Essential Information</th>
<th>Desirable Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients full name or proper coded identifier**</td>
<td>Patient’s address</td>
<td></td>
</tr>
<tr>
<td>D.O.B. and/or Patient’s Medical Record Number (MRN/RID)</td>
<td>Patient’s sex</td>
<td>Clinical details, relevant therapy and foreign travel (antibiotic treatment important for Microbiology), travel and prophylaxis history for Malaria</td>
</tr>
<tr>
<td>Patient’s location or destination for report or patient’s consultant or GP</td>
<td>Clinical details</td>
<td></td>
</tr>
<tr>
<td>Specific requirements of individual departments:</td>
<td>Date and time of specimen collection (timing in relation to antibiotic dose essential for Antibiotic Assays and for some Chemical Pathology tests)</td>
<td></td>
</tr>
<tr>
<td>Biochemistry:</td>
<td>Pathology:**</td>
<td></td>
</tr>
<tr>
<td>- Date and time of specimen collection</td>
<td>Date and time specimen taken.</td>
<td></td>
</tr>
<tr>
<td>- Clinical details</td>
<td>Previous relevant Histopathology Numbers (CUH/MUH) if applicable.</td>
<td></td>
</tr>
<tr>
<td>- Note:</td>
<td>Signature of clinician / nursing staff (pp)</td>
<td></td>
</tr>
<tr>
<td>- Certain analytes may not be processed if mandatory fields are incomplete</td>
<td>Clinician’s bleep number</td>
<td></td>
</tr>
<tr>
<td>- Request must come from a Qualified Healthcare Professional.</td>
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<tr>
<td>Haematology /Microbiology: Test Request</td>
<td></td>
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<tr>
<td>Pathology/Cytopathology</td>
<td></td>
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<tr>
<td>Requesting Clinician,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>**Clinical Information</td>
<td></td>
</tr>
</tbody>
</table>
| **Sample** | **Patients full name or proper coded identifier***  
D.O.B. and/or Patient’s Medical Record Number (MRN/RID)  
All non-blood samples: sample type or exact site  
Neuropathology: Autopsy brain specimens must be labelled with the PM number, the referring Pathologist and the date of the PM. Further details are at discretion of referring Pathologist. |
| --- | --- |
| **Requests using iCM** | **Samples requested using iCM have no accompanying forms.**  
Details must be complete on the sample container.  
* The identifiers which appear on the sample container must match the information provided on the accompanying request form  
**e.g. HIV specimens** |

**7.3.2 Blood Transfusion**

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

§For patient’s whose identity is unknown (e.g. Unconscious or Major Emergency scenario) the use of pseudonyms/MRNs as per Emergency Department protocols will be accepted.

**Note:** the CUMH uses the MN_CMS Millennium Electronic record. Transfusion specimen labels generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department.

Requests using iCM Blood Transfusion Samples are not to be Requested using iCM and will not be processed.

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

### 7.4 Time limits for requesting additional examinations

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

Analyses for additional tests are subject to the stability of the analyte. The analysis will be performed provided the specimen has been stored appropriately and there is sufficient specimen remaining to perform the additional tests.

The time limit for time limits for requesting additional examinations or further examinations for each department is given below:

<table>
<thead>
<tr>
<th>Department</th>
<th>Time Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autoimmune Serology</td>
<td>Within the 14-day specimen retention time (dependant on storage facilities) and subject to individual analyte stability.</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>The time limit for requesting additional examinations is generally within 7 days subject to individual analyte stability and dependant on storage facilities. Certain tests have a limited stability:</td>
</tr>
<tr>
<td></td>
<td>- Anti-TPO</td>
</tr>
<tr>
<td></td>
<td>- CK</td>
</tr>
<tr>
<td></td>
<td>- CSF</td>
</tr>
<tr>
<td></td>
<td>- Total and Direct Bilirubin</td>
</tr>
<tr>
<td></td>
<td>- Phosphate</td>
</tr>
<tr>
<td></td>
<td>- LDH</td>
</tr>
<tr>
<td></td>
<td>- HCG-B</td>
</tr>
<tr>
<td></td>
<td>- Oestradiol</td>
</tr>
<tr>
<td></td>
<td>- Troponin</td>
</tr>
<tr>
<td></td>
<td>- SHBG</td>
</tr>
<tr>
<td></td>
<td>- PTH</td>
</tr>
</tbody>
</table>

Please contact the laboratory with any queries.

Haematology Not all add-on tests can be accommodated; the factors influencing the capability of requesting Add-On Tests include storage requirements and stability of parameters measured. Please contact the laboratory if in doubt. The following is not an exhaustive list:

- Retics on FBC specimens <12 hours post phlebotomy
- ESR <12hrs
- Blood Films: Manual differential 12 hrs, slide Platelet 72 hrs and Red cell morphology 12 hrs
- DDI on Coagulation Sodium Citrate <24 hours post phlebotomy
- APTT on Coagulation, Sodium Citrate specimens <4 hours post phlebotomy
- Thrombophilia assays: contact laboratory
- HbA1c on FBC specimens 48 hours after receipt in laboratory
- Haemoglobinopathies on FBC specimens 48 hours after receipt in laboratory
7.5 List of factors known to significantly affect the performance of the
examination or the interpretation of the results

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

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

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

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

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

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

Blood Tests
- Patients may need to fast prior to certain blood tests. For example, patients should not eat or drink anything except water for 9 to 12 hours prior to glucose and lipid profile tests.
- The amount of blood drawn at the time of collection for laboratory testing depends on the tests that are ordered. Usually the amount collected is very small (around 3-6 teaspoons.)
- Some patients become anxious when they have their blood drawn. Patients should tell the health care professional who is drawing the blood if they feel faint or sick. Slow deep breaths prior to the needle stick may help to alleviate anxiety.
- After a blood draw, the phlebotomist makes sure that all signs of bleeding have stopped. A bandage is applied to the arm for a minimum of 15 minutes.
- Aspirin or other anticoagulant (blood thinners) drugs can prolong bleeding. In such cases, patients may need continued applied pressure until the bleeding has stopped. A cold pack may be necessary to reduce swelling and bruising.
- After a patient has blood drawn, even when bleeding has stopped, patients should not carry or lift a heavy object with that arm for a minimum of one hour.

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

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

- Clinicians consider personal medical history, family history, and results from physical examination when interpreting an individual patient's laboratory test results.

### 8.2 Phlebotomy Service at Cork University Hospital

Senior Phlebotomist: Ms Hilda Forde  
Contact Numbers: Phone: 22415 (Blood Room) Bleep no: 287  
Phlebotomy is based in the Out-Patients Department.

Wards: The service is Monday to Friday.  
7:30am to 12:15pm  
1.45pm to 3.30pm (for pre-operative blood tests only).

Clinics: The service is Monday to Friday.  
8:30am to 1:00pm  
1:30pm to 4:00pm  
4:00pm to 5:00pm (limited services for out-patient clinics only).

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

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

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

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

<table>
<thead>
<tr>
<th>Specimen Volume</th>
<th>Order Of Draw</th>
<th>Closure Colour</th>
<th>Tube Contents</th>
<th>Assays</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ml</td>
<td></td>
<td>Blue</td>
<td>Trisodium Citrate solution</td>
<td>Coagulation Studies</td>
</tr>
<tr>
<td>4ml</td>
<td></td>
<td>Red</td>
<td>Separation Gel Clotting Accelerator</td>
<td>Biochemistry Profiles, Viral Studies, Hormone Studies, Immunology, Anti Cardiolipin AB., B12, Folate, Ferritin, RA, Intrinsic Factor AB, Iron Studies, CRP’s, TDM (Therapeutic Drug Monitoring), Copper and Zinc levels.</td>
</tr>
<tr>
<td>4ml</td>
<td></td>
<td>Red</td>
<td>Clotted (Gel free)</td>
<td>Cryoglobulins, Methotrexate</td>
</tr>
<tr>
<td>4ml</td>
<td></td>
<td>Green</td>
<td>Heparin</td>
<td>Chromosomes, Lead Levels, DNA Analysis</td>
</tr>
<tr>
<td>3ml</td>
<td></td>
<td>Purple</td>
<td>EDTA</td>
<td>FBC, HBA1C, Hb. Electrophoresis, Malaria Parasites, Sickle Cell, Reticulocyte Count, Coombs Test, Cyclosporin, Tacrolimus ESR, Immunophenotyping, PTH, Cryoglobulins</td>
</tr>
<tr>
<td>6ml</td>
<td></td>
<td>Pink</td>
<td>EDTA</td>
<td>Crossmatch, Group &amp; Antibody Screen</td>
</tr>
<tr>
<td>4ml</td>
<td></td>
<td>Grey</td>
<td>EDTA sodium fluroide</td>
<td>Glucose, Glucose Tolerance, Lactate, Alcohol Levels</td>
</tr>
<tr>
<td>9ml</td>
<td></td>
<td>Yellow</td>
<td>ACD-A</td>
<td>HLA Typing</td>
</tr>
</tbody>
</table>
8.4 Minimum Sample requirements for Paediatric/neonatal patients

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

<table>
<thead>
<tr>
<th>Test</th>
<th>Sample Type</th>
<th>Minimum Volume</th>
<th>Additional Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>U/E, Creat, Ca, Mg, Phos, Bili, Lfts</td>
<td>Li Heparin or clotted sample (orange top/clear top)</td>
<td>1ml</td>
<td></td>
</tr>
<tr>
<td>TFT's</td>
<td>Li Heparin or clotted sample (orange/clear top)</td>
<td>0.75ml</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>Fluoride oxalate (yellow top)</td>
<td>0.5ml</td>
<td></td>
</tr>
<tr>
<td>Ammonia</td>
<td>Li Heparin (orange top)</td>
<td>0.5ml</td>
<td>Send on ice</td>
</tr>
<tr>
<td>Blood amino acids</td>
<td>Li Heparin (orange top)</td>
<td>150ul</td>
<td></td>
</tr>
<tr>
<td>Urine amino acids</td>
<td>Urine</td>
<td>4ml</td>
<td></td>
</tr>
<tr>
<td>Organic Acids</td>
<td>Urine</td>
<td>4ml</td>
<td></td>
</tr>
<tr>
<td>Acylcarnitine</td>
<td>Blood spot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very long chain fatty acids</td>
<td>EDTA (red top)</td>
<td>2ml</td>
<td></td>
</tr>
<tr>
<td>Lysosomal enzymes</td>
<td>EDTA</td>
<td>5ml</td>
<td>16 enzymes measured here, specific enzymes can be requested with a sample volume of 3ml</td>
</tr>
<tr>
<td>Transferrin isoforms</td>
<td>Clotted sample (Clear top)</td>
<td>0.75ml</td>
<td>Not for babies &lt;3 weeks</td>
</tr>
<tr>
<td>Biotinidase</td>
<td>Li Heparin</td>
<td>0.5ml</td>
<td>Frozen in &lt;1hour</td>
</tr>
<tr>
<td>Free fatty acids and β- hydroxybutyrate</td>
<td>Fluoride oxalate</td>
<td>2ml</td>
<td></td>
</tr>
<tr>
<td>Insulin and C-peptide</td>
<td>Clotted sample</td>
<td>2ml</td>
<td>Haemolysed samples unsuitable</td>
</tr>
<tr>
<td>Growth Hormone</td>
<td>Li heparin or clotted sample</td>
<td>1ml</td>
<td></td>
</tr>
<tr>
<td>Cortisol</td>
<td>Li heparin or clotted</td>
<td>0.75ml</td>
<td></td>
</tr>
<tr>
<td>17-hydroxyprogesterone</td>
<td>Li heparin or clotted</td>
<td>1ml</td>
<td>Only after 48hrs post birth</td>
</tr>
<tr>
<td>Mycophenolate</td>
<td>EDTA</td>
<td>1ml</td>
<td>Spin &lt;6hrs</td>
</tr>
</tbody>
</table>


**8.5 Sample Storage Conditions**

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

**Haematology**
1. If delays are unavoidable, HAEMATOLOGY specimens can be preserved by refrigeration at 2-8°C in a designated specimen fridge e.g. Full Blood Counts, HbA1c, Haematinics
2. Coagulation samples for INR must be stored at 18-22°C (Refrigeration may lead to cold activation of coagulation factors)
3. Addition of test requests to existing samples is not recommended due to issues of sample integrity. Contact individual laboratory for advice.

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

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

**Microbiology (Infectious Diseases Serology)**
*Clotted Blood and EDTA Blood for Molecular Investigations*
Serum and plasma must be removed and frozen at ≤-20°C by the laboratory within 24 hours of venepuncture to maintain the integrity of the viral genetic material. Therefore, samples must be sent to the laboratory without delay. Samples received greater than 24 hours from collection will NOT be processed.
Clotted Blood for Serological Investigations
Specimens should be transported to the laboratory without delay. If delay is unavoidable, please store at 2-8°C.

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

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

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

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

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

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

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

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

9.1  Turnaround Times

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

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

TAT are routinely monitored as part of the laboratories quality improvement program.
## 9.2 Critical Results Reporting

### Biochemistry

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>&gt;510 U/L (Female)</td>
</tr>
<tr>
<td></td>
<td>&gt;675 U/L (Male)</td>
</tr>
<tr>
<td>AST</td>
<td>&gt;630 U/L</td>
</tr>
<tr>
<td>Ammonia</td>
<td>&gt;100 μmol/L (infant/child)</td>
</tr>
<tr>
<td>Amylase</td>
<td>&gt;600 U/L</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>&lt;10 mmol/L</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>&gt;25 (Neonates only)</td>
</tr>
<tr>
<td>Calcium</td>
<td>&lt;1.8 mmol/L</td>
</tr>
<tr>
<td>Cortisol</td>
<td>&lt;50 nmol/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>&gt;345 μmol/L (≥200 μmol/L if &lt;16 y.o.) An increase of 1.5 times from the lowest value in the last 0-7 days;</td>
</tr>
<tr>
<td>CK (total)</td>
<td>≥5000 U/L</td>
</tr>
<tr>
<td>CRP</td>
<td>300 mg/L (primary care only)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>&gt;2.5 μg/L</td>
</tr>
<tr>
<td>Ethanol</td>
<td>4000 mg/L</td>
</tr>
<tr>
<td>FT4</td>
<td>&lt;5, &gt;50 pmol/L (Unless CRAD)</td>
</tr>
<tr>
<td>Glucose</td>
<td>&lt;2.5 mmol/L</td>
</tr>
<tr>
<td></td>
<td>&gt;25 mmol/L</td>
</tr>
<tr>
<td></td>
<td>≥15 mmol/L if &lt;16 y.o.</td>
</tr>
<tr>
<td></td>
<td>&gt;30 mmol/L in known DM</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>&lt;2.5 mmol/L</td>
</tr>
<tr>
<td></td>
<td>&gt;6.5 mmol/L</td>
</tr>
<tr>
<td>Lactate</td>
<td>&gt;4.0 mmol/L</td>
</tr>
<tr>
<td>Lithium</td>
<td>&gt;1.5 mmol/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>&lt;0.4 mmol/L</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>&lt;120 mmol/L</td>
</tr>
<tr>
<td></td>
<td>(&lt;130 mmol/L if &lt; 16 y.o.)</td>
</tr>
<tr>
<td></td>
<td>&gt;160 mmol/L</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>&gt;30 mg/L (4 hours post ingestion)</td>
</tr>
<tr>
<td>Phosphate</td>
<td>≤0.35 mmol/L</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>≥28 mg/L</td>
</tr>
<tr>
<td>Salicylate</td>
<td>≥300 mg/L</td>
</tr>
<tr>
<td>Theophylline</td>
<td>≤25 mg/L</td>
</tr>
<tr>
<td>Troponin (ED only)</td>
<td>≥34 ng/L (Male)</td>
</tr>
<tr>
<td></td>
<td>&gt;16 ng/L (Female)</td>
</tr>
<tr>
<td>Urate</td>
<td>&gt;340 μmol/L (Antenatal only)</td>
</tr>
<tr>
<td>Urea</td>
<td>≥30 mmol/L (≥ 10 mmol/L if &lt;16 y.o.)</td>
</tr>
</tbody>
</table>

### Haematology

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC x 10^9/l</td>
<td>&lt;1.00</td>
</tr>
<tr>
<td>WBC x 10^9/l</td>
<td>&gt;35 (GP), &gt;50 (Ward)</td>
</tr>
<tr>
<td>PLT x 10^9/l</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>&lt;0.5 x 10^9/l (0.5 - 1.0 phoned next day)</td>
</tr>
<tr>
<td>Kliehauers</td>
<td>Foetal bleed &gt;12 mls</td>
</tr>
<tr>
<td>APTT</td>
<td>Results &gt; 100 secs</td>
</tr>
<tr>
<td>INR</td>
<td>&gt;4.5 (&gt;4.5 and &lt;5.0 and GP - Next morning OK all others to Sth doc)</td>
</tr>
</tbody>
</table>

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

- Positive sickle cell screens in patients with pre-op indicated on form
- Positive HCGs in hospitalised in-patients
- Urgent Factor assays
- Positive HIT screens
- Haemolytic Uremic Syndrome
- Newly diagnosed Leukaemia’s
- Positive Malaria infections
- Positive Monospot Screening test
- Equivocal Pregnancy Tests
### Microbiology

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

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

### Enterics
- New positive results: bacterial, viral or parasitic

### Infectious Diseases Serology
- Positive results for HIV serology, Hepatitis C serology, Hepatitis B serology, Hepatitis A IgM, syphilis serology, Lyme IgM/IgG, Toxoplasma IgM, EBV IgM, CMV IgM, Parvovirus IgM, Rubella IgM, Leptospira IgM, Mycoplasma pneumoniae IgM, urinary antigens, RSV antigen.

### Pathology

- Frozen section reports
- All positive temporal artery biopsies (Neuropathology)
- Other reports at the discretion of the reporting Pathologist

#### 9.3 Printed Reports
1. Reports are printed with reference ranges and/or suitable comments wherever appropriate, to aid interpretation of results. Reports will only be given to the submitter. Private individuals will not receive reports.
2. Please note the printed authorised report (or an amended subsequent report) issued by Laboratory Medicine is the medico-legal document within the patient record.
3. Printed reports are delivered by the portering staff to CUH wards.
4. External hospitals are printed and issued as follows:
   - Bon Secours Hospital: Posted
   - Mallow General Hospital: Collected daily
   - Mercy University Hospital: Collected daily
   - St. Mary's Campus: Collected daily
   - St. Finbarr's Hospital: Collected daily
   - South Infirmary Hospital: South Infirmary porter collects reports periodically throughout the day.
5. Results for General Practitioners are printed and posted daily.
6. Emergency, critical and urgent positive reports are phoned directly to the wards and/or ordering clinician.
7. Results are electronically sent to some General Practitioners who have registered with GP messaging for more information (see below).

**Pathology:** Responsibility for receipt of report lies with the requesting clinician.
GP Messaging - Electronic delivery of laboratory reports to the GP practice

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

Electronic laboratory facilitated reports are issued for Biochemistry, Haematology and Microbiology only.

Electronic reports are issued from Laboratory Medicine in real time. To avoid reports going to the wrong GP practice it is best to clearly print your laboratory GP location code on any test request forms being sent to Laboratory Medicine. Some practices have their laboratory GP location code incorporated into their practice stamp or on their computer generated address labels.

If you do not know your laboratory GP location code contact Laboratory Medicine at CUH on 021-4921309.

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

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

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

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

The applicant is responsible for the proper use of the facility.
- Usernames and Passwords must not be shared.
- Any patient specific information gained through work or on receiving reports from Laboratory Medicine is strictly confidential and must not be relayed or discussed with any third party unless they are specifically authorized to receive the information.
- Never examine any material or report that is not pertinent to your work.
- Only a doctor may authorise Laboratory Medicine information being passed to a third party. The points outlined in the Medical Council Guidelines section 31.03 should be borne in mind by any doctor passing information to a third party.
- All patient identifiable information must be held securely and locked away when not personally attended; such data must never be stored on removable storage devices (USB memory key, floppy disk, CD/DVD).
- If patient identifiable information is entered on computer, that computer should be password protected
- Never transmit confidential named patient data by email with the exception of @hse.ie accounts or to the following addresses:

Voluntary Hospitals:
- AMNCH, Tallaght @amnch.ie
- Beaumont Hospital @beaumont.ie
- Cappagh National Orthopaedic Hospital @cappagh.ie
- Coombe Women & Infants University Hospital @coombe.ie
- Mater Public, Dublin @mater.ie
- Marymount University Hospital and Hospice, Cork @marymount.ie
- Mercy University Hospital, Cork @muh.ie
- National Maternity Hospital, Holles Street, @nmh.ie
- National Rehabilitation Hospital, @nrh.ie
- Our Lady’s Hospice, Harold’s Cross, Dublin @olh.ie
- Our Lady’s Children’s Hospital, Crumlin @olchc.ie and @olhsc.ie
- Rotunda Maternity Hospital, Dublin @rotunda.ie
- South Infirmary Victoria University Hospital, Cork @sivuh.ie
- St. Francis Hospice, Dublin @sfh.ie
- St. James’s Hospital, Dublin @stjames.ie
- St. John’s Hospital, Limerick @stjohnshospital.ie
- St. Luke’s Hospital, Rathgar, Dublin @slh.ie
- St. Vincent’s Hospitals Group @st---vincents.ie, @svuh.ie, @stmichaels.ie, @svhg.ie
- Temple Street Children’s University Hospital @cuh.ie
Private Hospitals And Clinics

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

Agencies:

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

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

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

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

Information Security Policy and Information Technology Acceptable Usage Policy

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

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

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

10.3 Instructions for using Lab Enquiry/Netterm

1. Click once **the “Yellow Telephone” icon** from toolbar
2. Enter Username and Password.
3. From Ward Enquiry Menu Screen select 1.
4. From Ward Enquiry Screen where prompted Patient Number enter C for Cork
PIMS registered patients OR T for Tralee PIMS registered patients followed by
the patients Medical Record Number
5. Under surname enter the first three letters of the patient’s surname.

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

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

**NB** -When finished search click this button < מגיע from toolbar to exit Lab Enquiry.

How To Change the Lab Enquiry Password (automatic account deactivation after
three months if not updated)
1. Type UPASS in the main menu after logging on the system.
2. Enter your current password and new password twice.
3. The new password cannot be the same as the last and must contain at least
five letters and one number.
4. Accept new password. This new password takes immediate effect.
5. The password will be valid for three months and you will get a warning on
screen every time you log on starting 20 days from the expiry date.
6. If you have any problems changing your password contact the Laboratory
Information Systems Helpdesk by e-mail at CUHIT.Pathology@hse.ie or by
phone on 021-4920150

**10.4 Instructions i.Laboratory/Web Browser**

Please note the icon for this application can be found on Staff Directory under
Online applications, or by clicking on the following link

This document is designed for online viewing. Printed copies, although permitted, are deemed Uncontrolled from 23:59
hours on 28/09/18
1. Enter the Username and Password (if you have a problem logging on check if pop blocker is on).
2. Where prompted Patient Number enter C for Cork PIMS registered patients OR T for Tralee PIMS registered patients followed by the patients Medical Record Number
3. Under surname enter the first three letters of the patient’s surname.
4. Then click the grey “NUMBER SEARCH” button on the right hand side of the screen.

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

How To Change the Lab Enquiry password (automatic account deactivation after three months if not updated
1. On iLaboratory log in screen click Change password button.
2. Enter your current username, current password and new password where prompted.
   Note: The new password cannot be the same as the last and must contain at least five letters and one number.
3. Then click the Ok button. This new password takes immediate effect.
4. The password will be valid for three months and you will get a warning on screen every time you log on starting 20 days from the expiry date.
5. If you have any problems changing your password contact the Laboratory Information Systems Helpdesk by e-mail at CUHIT.Pathology@hse.ie on by phone on 021-4920150
10.5 ISOFT Clinical Manager (iCM)

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

NB for full details on use of iCM please refer to the ICT User Manual
All iCM user data including how to apply for an account, logging onto iCM and searching for patient data can be found on Staff Directory under Guidelines ➔ iCM Users Guidelines or by clicking on the following link:
http://100.24.9.212/Menu_ApplicationForms/UserAccountRequestFormDoctors/UserGuides.asp

Logging on to iCM
Log into iPM
Select iCM Production
This opens the iCM Log-On Screen Log into iCM please note the Username format is different from Citrix 4.5 as it does not contain a dot between firstname and surname. e.g. If you log into Citrix 4.5 as test.frank then your ICM log in will be testfrank.
10.5.1 Selecting a Patient
1. On logging into ICM the Patient List displays a list of current patients in a specified area.
2. The List Displayed is shown in the Current List dropdown box which can be changed by selecting a different dropdown option. To select a patient click on chosen patient so their details will display on the header.

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

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

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

NB As Microbiology results and Positive/Negative text based abnormal results are not flagged
A button in a result field indicates that there is an expanded result – right click to view entire comment.

A in a result filed indicates that a result has been modified - right click to view previous result.
view can be modified to select a specified date range or performing laboratory or test by selectively choosing options on the left hand sidebar

10.5.5 Contingency

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

Result Viewing

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

Remember
Patient identity must be confirmed before phlebotomy
Samples must be labelled at all times
For training, fault logging, etc please contact the ICT Helpdesk on 28000 or email cuh.helpdesk@hse.ie

10.6 Instructions for using the Blood Collection System Through Lab Enquiry

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

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

Double click on Lab Enquiry icon for results

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

• When the porter/person collecting the unit arrives in the laboratory to collect the unit of blood or blood product, they time-stamp the yellow collection slip.

• The yellow collection slip is then brought to the ward with the blood/blood product, where it is again time-stamped on receipt.

• The nurse who receives the unit of blood at the ward then signs on the appropriate line on the yellow collection slip to verify receipt of the blood/blood product.

• When the unit of blood/blood product is ‘hung’, the smaller sticky strip from the bar-coded patient identification label on the blood/blood product is stuck on the appropriate line on the yellow collection slip, and the nurse who has transfused the blood/blood product signs on the appropriate line.

• The yellow collection slips are then collected and returned to the Blood Transfusion Laboratory, where they serve as transfusion confirmation records.

NB -When finished search click this button from toolbar to exit Lab Enquiry.
11 ON CALL (EMERGENCY SERVICE)

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

Tests Available On-Call

<table>
<thead>
<tr>
<th>Test</th>
<th>Laboratory</th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Requiring Consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alanine amino Transferase</td>
<td>Biochemistry</td>
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<tr>
<td>Albumin</td>
<td>Biochemistry</td>
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<tr>
<td>Alkaline phosphatase</td>
<td>Biochemistry</td>
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<td>Ammonia</td>
<td>Biochemistry</td>
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<td>Amylase</td>
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<td>Antibiotic Assays</td>
<td>Microbiology</td>
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<tr>
<td>Antibody Screen</td>
<td>Blood Transfusion</td>
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<tr>
<td>APTT</td>
<td>Haematology</td>
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<tr>
<td>Aspartate amino Transferase (AST)</td>
<td>Biochemistry</td>
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<td>Blood Cultures</td>
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<td>Blood gases</td>
<td>Biochemistry</td>
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<tr>
<td>B-HCG (Blood)²</td>
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<tr>
<td>Calcium</td>
<td>Biochemistry</td>
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<td>Carbamazapine (Tegretol)²</td>
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<td>Carboxyhaemoglobin</td>
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<tr>
<td>Cold Agglutinins</td>
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<td>CAPD Fluid</td>
<td>Microbiology</td>
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<td>Creatine kinase (CK)</td>
<td>Biochemistry</td>
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<td>Creatinine</td>
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<tr>
<td>C R P (C-Reactive Protein)</td>
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<td>CSF Microscopy and Culture</td>
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<td>CSF Protein and Glucose</td>
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<td>Direct Coombs Test</td>
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<tr>
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<td>Epanutin (Phenytoin)²</td>
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<td>Epilim (Sodium Valproate)²</td>
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<td>Group and Crossmatch³</td>
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<td>Group and Hold</td>
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<td>Haemolysin Test</td>
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<td>HIV1/2 antibody, HBsAg, HCV antibody (Needlestick Injury - Source)</td>
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<tr>
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</tr>
<tr>
<td>Transfusion Reaction Investigation</td>
<td>Blood Transfusion</td>
<td></td>
<td>✅</td>
<td></td>
</tr>
<tr>
<td>Troponin I⁶</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urate</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary creatinine</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary electrolytes</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary urea</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary Osmolality</td>
<td>Biochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine Microscopy and Culture (urgent e.g. A/E)</td>
<td>Microbiology</td>
<td></td>
<td>✅</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Urgent Beta HCG requests only will be processed.
2. Currently analysis of these drugs (TDM) is only available in an ‘over-dose’ situation. Routine monitoring of the anti-epileptic drugs, digoxin and theophylline on Saturday and Sunday mornings.
3. Blood is crossmatched only for Emergency purposes. Requests for blood for planned transfusion will generally not be crossmatched during emergency “On Call” hours and will be processed on the next routine working day.
4. Sterile body fluids marked “special attention” or “emergency”. Sputa and swabs (excluding MRSA screens and HVS) marked “special attention” or “emergency” daily up to 8pm.
5. Prolactin requests will be processed only to exclude a prolactin-secreting tumour when emergency surgery is contemplated.
6. Troponin I requests which fulfil the agreed criteria.
7. All Coagulation Factor assays must be requested by prior approval by Consultant Haematologist On Call.
12 BLOOD TRANSFUSION

Laboratory Profile: The Blood Transfusion Laboratory at CUH provides testing and advice to users in relation to general transfusion issues including antenatal blood group serology. Since September 2008, it operates a quality management system to ISO15189 standards and since that time has been accredited by the Irish National Accreditation Board (INAB) under scope reference 199MT (details available from www.inab.ie). The laboratory continues to actively engage in the accreditation process to ensure compliance with the EU Blood Directive 2002/98/EC and other relevant legislation and works closely with Haemovigilance personnel to ensure all aspects of best transfusion practice, Haemovigilance and Traceability requirements are maintained.

In 2017, 28,683 group and antibody screen specimens plus 1,905 infant blood group specimens were analysed with 8,388 units of red cells, 1,216 units of SD plasma and 1,821 units of platelets transfused. The laboratory also plays an important role in the care and management of antenatal patients and those patients who may require transfusions with various blood components or products while in hospital.

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

Tests available: The following table outlines the tests available from the Blood Transfusion Laboratory, CUH. Details of tests are contained in the A to Z section of this Handbook.

<table>
<thead>
<tr>
<th>INAB Accredited Tests Available</th>
<th>Non INAB accredited Tests Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal Serology (Blood Group + Antibody Screen +/- Antibody Identification)</td>
<td>Antibody Titration</td>
</tr>
<tr>
<td>Blood Group and Coombs</td>
<td>Anti-c Quantitation</td>
</tr>
<tr>
<td>Blood Group and Crossmatch</td>
<td>Anti-D Quantitation</td>
</tr>
<tr>
<td>Blood Group and Hold</td>
<td>Anti-Platelet Antibody Investigation</td>
</tr>
<tr>
<td>Blood Transfusion Reaction Investigation (Blood Group + Antibody Screen +/-)</td>
<td>Cold Agglutinins</td>
</tr>
</tbody>
</table>
INAB Accredited Tests Available

<table>
<thead>
<tr>
<th>Antibody Identification + Crossmatch +/- Red Cell Phenotyping</th>
<th>Non INAB accredited Tests Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibody Identification + Crossmatch</td>
<td>Foetal Genotype</td>
</tr>
<tr>
<td>+/- Red Cell Phenotyping</td>
<td>Haemolysin Test</td>
</tr>
<tr>
<td>Direct Coombs Test</td>
<td>HLA Antibody (Antibody to Human Leucocyte Antigen)</td>
</tr>
<tr>
<td>Phenotyping Red Cell Antigens</td>
<td>HLA Typing</td>
</tr>
<tr>
<td></td>
<td>HPA (Human Platelet Antigen + Antibody Investigation for NAITP)</td>
</tr>
<tr>
<td></td>
<td>Leucocyte (White Cell) Antibody Investigation</td>
</tr>
<tr>
<td></td>
<td>Platelet Antibody Investigation</td>
</tr>
<tr>
<td></td>
<td>Cytotoxic Antibodies</td>
</tr>
<tr>
<td></td>
<td>Foetal DNA testing (for Rh typing).</td>
</tr>
</tbody>
</table>

It is very important that sample tubes used are within their expiry date. Please note that expired sample bottles may be rejected and repeat samples requested.

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

On-call services: Only emergency samples are processed during on-call hours. The list of tests available during out-of-hours on-call times are listed in this handbook with specific notes as appropriate. Samples for elective procedures should be brought directly to the laboratory before 5 p.m. on the day prior to surgery. It cannot be guaranteed that blood will be ready for elective surgery the following morning if samples arrive in the laboratory after this time.

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

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

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

- From the patient perspective, there are no specific requirements in terms of fasting etc. with regard to preparation prior to sample collection.
- Blood transfusion samples may only be taken by Doctors or specially trained Nurses/Midwives at CUH/CUMH.
- Request forms and samples for blood transfusion laboratory requests from all users of the service MUST be handwritten.
- **Note:** The CUMH uses the MN_CMS Millennium Electronic record. Transfusion sample labels & forms generated correctly through the MN_CMS EHR are accepted in the CUH Blood Transfusion Department.
- Essential information required on both samples and forms MUST include:
  - Patient’s Forename
  - Patient’s Surname
  - MRN (in case of GP sample where no MRN available the address to be used)
  - Date of Birth
  - Identity of person taking the sample (Doctor/dedicated nurse) including bleep/contact number. Ideally, Doctors should include their MCRN, Nurses/Midwives should include An Bord Altranais PIN.
  - Date and time that the sample was taken.
  - Unconscious patients admitted to the emergency department should be identified using the system as agreed with the blood transfusion laboratory, CUH as detailed in local instructions (Please be familiar with current instructions in the emergency department).
  - In the event of a major incident when many patients may be admitted at the same time, the labelling protocols should be used as described in the local major incident policies available in the Emergency Department.
  - The volume of blood sample required for blood transfusion testing should be sufficient to meet the needs of testing procedures requested. The volumes required are outlined in A to Z section.
  - A fresh blood sample must be obtained 48 hours after commencement of a blood transfusion if a patient is to receive additional blood. Fresh blood samples are required from patients if they have been transfused or pregnant within the past 3 months. This “48hr rule” may be extended in pregnancy in certain cases to 7 days.
  - Adequate completion of requests should include clinical information so that work may be prioritised and processed accordingly in the laboratory (e.g. obstetric history, transfusion history, reason for transfusion).
  - Samples should be transported to the laboratory using the guidelines described in this document. All inpatient samples should be brought directly into the laboratory and not left at Laboratory Reception. Samples sent using the pneumatic chute system should be accompanied with a telephone call to alert Laboratory personnel.
  - Samples should arrive in the laboratory no later than 48 hrs after sampling.
  - Materials used in the collection of primary samples should be disposed of in accordance with local health and safety guidelines.
- Ordering Frozen Plasma (e.g.)
  - Products should be ordered by telephoning the CUH Blood Transfusion Laboratory and by sending a fully completed Blood Product Requisition
Octaplas/Uniplas, Prothrombin Complex Concentrate (e.g. Octaplex), Paediatric Cryoprecipitate, Albumin and other Blood Products:

- Plasma is stored at less than -18°C and requires 30-45 minutes to be prepared depending on the number of units required. Once thawed, if not used within 4 hours, the Blood Transfusion Department must be contacted, as it may be necessary to discard the product.
- Plasma is NOT routinely necessary in the management of over-anticoagulation with warfarin and the National Haemovigilance Office has issued the following guidelines:

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

Ordering Platelets:
Contact the CUH Blood Transfusion laboratory and inform the laboratory staff of the platelet requirements. Complete the blood product requisition form and send to the laboratory. Laboratory personnel may have to request a sample for grouping if no record of blood group is available in the laboratory. Laboratory personnel will arrange the delivery of platelets from IBTS. It may not always be possible to have ABO compatible platelets available from IBTS, so laboratory personnel may need to confirm suitability with requesting clinician. Once labeled and prepared, the laboratory will contact the requesting location that the platelets are ready.

Requesting Additional Examinations:
Products should be ordered by telephoning the CUH Blood Transfusion Laboratory and by sending a fully completed Blood Product Requisition Form (LF-C-BTR-PROREQ) to the laboratory. Addressograph labels may be used on this form however this form MUST be signed by the requestor. If requesting additional red cells it is important to note that from the commencement of a transfusion, the sample used for that crossmatch is only valid for a further 48 hours after which time a new sample is required. This is to check for the presence of developing red cell antibodies in the recipient following exposure to red cell antigens in donor blood. The identity of the person requesting additional red cells should be made known to laboratory personnel. Further tests on a specimen that is already in the laboratory can be requested by contacting the laboratory, where it will be established if the test may be possible.

Storage and Red cells are stored between 2-6°C in temperature-controlled and monitored
collection of Red Cells:  When blood or blood products are required for a patient, the ward can generate a blood collection slip from certain designated PC terminals. This collection slip is printed in the laboratory and is used to identify the patient for whom blood is required, and as such is an integral part of the blood transfusion traceability system. Having first viewed the most recent haemoglobin result, the ward generates a collection slip for porters (which is printed in the laboratory). The ward then requests the porter to collect the blood or blood product. The porter collects the blood or blood product in accordance with current procedures. Training is provided to all staff involved in the collection of blood and blood components by CUH haemovigilance personnel. The collection slip then accompanies the blood or blood product to the ward, where it serves as the transfusion confirmation slip, which is then returned to the transfusion laboratory, when the blood or blood product has been transfused. Any queries in relation to this system of blood collection should be directed to Haemovigilance personnel or blood transfusion laboratory staff as described in this handbook.

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

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

Storage and collection of Platelets: Platelets are stored between 20-24°C on a special platelet agitator in the blood transfusion laboratory. Platelets are collected in the same process as described for red cells above. Platelets should not be stored at ward level and should be returned to the laboratory immediately if not being used.

Storage and collection of Plasma (e.g. Octaplas/Uniplas and Paediatric Cryoprecipitate). These products are thawed in the laboratory upon request. Once thawed, they are stored at room temperature (monitored) in the laboratory and it is recommended that they are used within 4 hours from thawing. Collection of these blood products is as described for red cells above.

Storage and collection of Albumin and other blood products: Albumin (5% 500 mL) is stored at room temperature (monitored) in the laboratory. All other products are stored between 2-8°C in temperature controlled and monitored fridges. Collection of these blood products is as described for red cells above.

Storage of samples in the Blood Transfusion Laboratory: Original samples are stored for 1 week between 2-8°C. Separated plasma samples are stored for approximately 3 weeks below -30°C. Antenatal patient plasma samples containing antibodies are stored for the duration of the pregnancy approximately. After this time, samples are disposed in accordance with local policies.

Emergency O Rh (D) A limited number of O Rh (D) Negative Blood are available for EXTREME emergency situations. These units are stored in selected locations which...
Negative Blood: include the blood transfusion laboratory issue fridge and the theatre reception fridge. The laboratory must be informed if these units are used and the accompanying form must be fully completed and returned to the laboratory.

Blood Transferred with a patient from an external location:
Any blood transferred to the CUH with a patient from an external source (e.g. another hospital) should be brought directly to the blood transfusion laboratory. It is essential that any documentation accompanying the blood is completed accordingly and given to the transfusion laboratory personnel. It is imperative that the storage conditions of blood ‘in transit’ are controlled. It is also necessary to obtain a fresh group and hold sample as soon as possible from such patients so that should additional blood be required, it can be used for crossmatching in the CUH blood transfusion laboratory.

General Haemovigilance:
Haemovigilance may be defined as: “a set of surveillance procedures, from the collection of blood and its components, to the follow up of recipients to collect and assess information on unexpected or undesirable effects resulting from the therapeutic use of labile blood products, and to prevent their occurrence or recurrence” (National Haemovigilance Office, 2004.)

Since 2005 the role of the Haemovigilance staff has been greatly influenced by the transposition into Irish law of the EU Blood Directive 2002/98/EC. The directive became law in Ireland on the 8th February 2005 and has implications for all hospital blood banks. Eight articles apply directly to all staff involved in the transfusion process throughout the hospital. The major implications involve the implementation of quality systems for all aspects of transfusion, the total traceability of every blood product, the training of personnel involved in the transfusion process and the reporting of any serious adverse reactions or events associated with the transfusion of blood components. Compliance with this legislation is policed by the Health Products Regulatory Authority (HPRA, formerly known as the Irish Medicines Board) under the HPRA Act 1995 and in the event of directive non-compliance; the HPRA has censure authority up to and including the closure of a facility.

The remit of the haemovigilance personnel includes the following:
- Promotion of safe and effective transfusion practice for those receiving blood components/products.
- Participation in local working groups and on a national basis to promote the safe and effective transfusion practice for those receiving blood components/products.
- Provision of educational programmes for staff involved in the transfusion process.
- Participation in and development of audit initiatives as appropriate.
- Development and maintenance of effective channels of communication by encouraging networking, support and cross-clinical group working.
- Contribution to the shaping of policy relating to transfusion of blood components by responding to local and national developments.
- Investigation of any serious adverse reactions or events associated with the transfusion of blood components.
- Maintenance of blood component traceability.

Haemovigilance Training and Policies

Haemovigilance personnel have put policies and procedures in place via the Q-Pulse document management system in CUH promoting good transfusion practice in clinical areas. Scheduled Haemovigilance education sessions are provided by Haemovigilance personnel to all clinical staff. Clinical staff who are unable to attend these scheduled training sessions should make contact with the CUH/CUMH haemovigilance personnel to arrange training.

It is CUH policy that all clinicians should have completed both (Safe Transfusion Practice (Formerly Module 1) and Blood Components and Indications for Use (Formerly Module 2) of the SNBTS LearnPro elearning program. ([www.learnbloodtransfusion.org.uk/](http://www.learnbloodtransfusion.org.uk/)). Instructions on how to access the Q-Pulse system and the SNBTS e-learning program are available from haemovigilance staff.

All hospitals have a legal requirement to trace each individual blood component, whether transfused or disposed of, in accordance with the EU Blood Directive (2002/98/EC). This information must be held and available for thirty years. Therefore, full and clear documentation associated with transfusion is essential.

All serious adverse reactions and events associated with the transfusion of blood components are investigated documented and, where required, reported to the National Haemovigilance Office through a confidential anonymous reporting system. If you suspect a transfusion reaction, you must contact the Blood Transfusion Laboratory or Haemovigilance personnel as identified in this Handbook. There is a Policy dealing with the recognition, investigation and management of a Suspected Transfusion Reaction on Q-Pulse. (PPG-CUH-CUH-30).

The decision to transfuse is the responsibility of the prescribing clinician and should be based on the best available evidence. The prescribing clinician should discuss the transfusion with the patient in accordance with hospital policy (PPG-CUH-CUH-80), document this discussion in the patient’s medical notes and should give the patient the ‘Having a Blood Transfusion – Information Leaflet for Patients and Guardians’– (INF-CUH-CUH-9). If the patient is to be discharged on the day of transfusion, the ‘Having a Blood Transfusion-Patients Transfused on Day of Discharge- Information Leaflet for Patients and Guardians’ (INF-CUH-CUH-15) should be given. (forms available from the Stationary Stores Department). Where clinically possible it is recommended that blood transfusions should only be given during routine working hours.

There is a policy available on Q-Pulse which details the procedure required for the prescription of blood & blood components. This policy also details the correct procedure for the taking of the pre-transfusion sample by medical staff. (PPG-CUH-CUH-36). There is also a policy covering the procedure for the taking of the pre-transfusion sample by nurses & midwives available on Q-Pulse. (PPG-CUH-NUR-7)

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

Results

Results are issued in Hard Copy report format.

Note: In the CUMH, transfusion results are available electronically through
the MN_CMS Millennium Electronic Health Record. It is the general policy of the laboratory not to issue results over the phone. Copy reports can be printed on request. In accordance with HSE policy, faxing of results can be facilitated in exceptional circumstances only. Users will be asked to fax a request for a faxed report, to ensure the laboratory can fax report to a secure fax number.

Advice and consultation: Should clarification be sought on any issues related to the Blood Transfusion Laboratory service at CUH, queries may be directed to Blood Transfusion Laboratory or Haemovigilance personnel as identified in this Handbook.

Complaints / Positive Feedback: The Blood Transfusion Laboratory at CUH endeavours to produce a system of continual improvement to meet the needs and requirements of users and in the best interest of patients. To facilitate this, the Blood Transfusion Laboratory welcomes all feedback (both Negative and Positive) and users can provide feedback by way of telephone call, email or in hard copy writing to contacts provided. All feedback will be processed in accordance with the laboratory’s feedback / complaints system.

Data Protection / Patient Information Code of Conduct: All staff in the laboratory are made aware of their responsibilities in relation to protection of personal patient information consistent with the Data Protection Act 2018 and Freedom of Information Act 2003. All records are retained in accordance with requirements outlined in EU Blood Directive 2002/98/EC and securely managed in accordance with local laboratory instruction MI-C-BTR-RECORDM.

Contingency: In the event that the laboratory’s computer system fails, a manual contingency plan is in place. Users may be informed that a manual back-up system is in place and are requested to facilitate the laboratory by limiting requests to ‘urgent requests’ only, while IT systems are restored.

In the extremely unlikely event that the laboratory is unable to provide a service (e.g. Fire/Flood Damage), the IBTS may provide a back-up service. Users may be requested to facilitate the laboratory by limiting requests to ‘urgent requests’ only, while service is restored on site in CUH.
13 TEST DIRECTORY (A-Z)

Acanthamoeba (amoebic keratitis)

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

Acanthamoeba (corneal scrape)

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Neuropathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Corneal scrape – special fixative required, (CytoLyt) available from Neuropathology Laboratory, 22519.</td>
</tr>
<tr>
<td>Comment</td>
<td>Please contact Neuropathology Department in advance on 4922520</td>
</tr>
<tr>
<td>Turnaround</td>
<td>1-2 days</td>
</tr>
</tbody>
</table>

ACTH

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Sample referred from CUH Biochemistry to Eurofins-Biomnis Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Special Tube (Aprotinin EDTA available from Biochemistry) on ice, must be frozen &lt; 30 minutes</td>
</tr>
<tr>
<td>Comment</td>
<td>Consultant request only</td>
</tr>
<tr>
<td>Turnaround</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>See report form, or visit internet site <a href="https://www.eurofins.ie/biomnis/">https://www.eurofins.ie/biomnis/</a> for up to date referral test information.</td>
</tr>
</tbody>
</table>

Activated Partial Thromboplastin Time (APTT)

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood 3mL/1mL blue Vacuette® (sodium citrate 3.2%)</td>
</tr>
<tr>
<td>Comment</td>
<td>A screening procedure used to evaluate abnormalities in the Intrinsic Coagulation Pathway and to monitor the effectiveness of heparin therapy. Also forms part of the Thrombophilia and /or Lupus screen. See Main Haematology Section on Guidelines for Investigation of Thrombophilia. Please note that specimens should arrive in the laboratory within 4 hours of sampling.</td>
</tr>
<tr>
<td>Turnaround</td>
<td>Urgent specimens: 2 hours. Ward specimens: 8 hours</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>Age Mean Range (secs)</td>
</tr>
<tr>
<td></td>
<td>Day 1 43 31 - 55</td>
</tr>
<tr>
<td></td>
<td>Day 5 43 25 - 60</td>
</tr>
<tr>
<td></td>
<td>Day 30 41 26 - 55</td>
</tr>
<tr>
<td></td>
<td>Day 90 37 28 - 43</td>
</tr>
<tr>
<td></td>
<td>Day 180 36 28 - 43</td>
</tr>
<tr>
<td></td>
<td>Adult 27 23 - 31</td>
</tr>
</tbody>
</table>

Activated Protein C Resistance (APCR Test)

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood 3mL, blue Vacuette® (sodium citrate 3.2%)</td>
</tr>
<tr>
<td>Comment</td>
<td>(Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling)</td>
</tr>
</tbody>
</table>
Comment: Test available Mon to Fri, during routine working hours. This test forms part of a Thrombophilia Screen, used as a screening test for Factor V Leiden mutation, see Main Haematology Section on Guidelines for Investigation of Thrombophilia (if positive an EDTA sample is confirmed by PCR analysis).

**Samples must be received within 4 hours.**

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

**Ref. Range:**
- Ratio ≥ 0.8 Negative
- Ratio: 0.71 – 0.79 Inconclusive
- Ratio ≤ 0.70 Positive

### Acyl Carnitine, blood spot

**Laboratory:** Sample referred from Clinical Biochemistry to The Children’s Hospital, Temple Street, Dublin

**Specimen:** Newborn screening card. 2 full circles

**Comment:** Consultant request only

**Turnaround:** 3 weeks

**Ref. Range:** See report form.

### Adenovirus Molecular Qualitative

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** Viral swab (eye, throat), stool, nasopharyngeal aspirate, sputum, bronchoalveolar lavage

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

**Turnaround:** 5 working days

**Report:** Detected or not detected

### Adenovirus Molecular Quantitative

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** 4mL EDTA blood

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

**Turnaround:** 5 working days

**Report:** Detected or not detected

### Adenovirus (faeces samples)

See Rotavirus/Adenovirus assay

### Adrenal Antibodies

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

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

**Turnaround:** Approx. 3 Weeks

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

### Alanine amino Transferase (ALT)

**Laboratory:** Clinical Biochemistry

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

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

**Ref. Range:** 4 - 45 U/L
Albumin (Blood)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL in blood plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days
Ref. Range: 35 – 52 g/L (0-4 days: 28-44 g/L)

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

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

Alcohol (Ethanol) (See also Toxicology Screen)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in glucose tube, (Sodium Fluoride, grey-capped) or in plain tube (clotted sample) or in Lithium Heparin tube. Spot urine sample
Comment: Do Not use alcohol swabs.
For acute medical emergencies only. Not useful for screening for alcohol abuse.
Turnaround: 1 Day
Ref. Range: Not normally detected
Concentrations of >180mg/dL are associated with disorientation. Levels >350mg/dL are usually required to produce coma. Fatal poisoning is associated with levels >450mg/dL

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

Alkaline phosphatase (Alk Phos)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 15mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days
Ref. Range: M:48 – 135 U/L (Adult ) F: 34 – 104 U/L (Adult)
Contact CUH Biochemistry Laboratory for Paediatric Age Related Range.

Alpha-1-Antitrypsin
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: 1.0–2.1 g/L (Adult). Contact Biochemistry lab for paediatric age-related ranges. If AAT result is <1 g/L, sample is referred to the Alpha 1 Foundation.

### Alpha-1-Antitrypsin Phenotyping

**Laboratory:** Sample referred from Clinical Biochemistry to Alpha 1 Foundation, Royal College of Surgeons in Ireland, Education and Research centre, Beaumont Hospital, Dublin 9.

**Specimen:** 0.2 mL serum

**Turnaround:** 2-3 weeks

**Ref. Range:** Contact Biochemistry

### Alpha-Amino Adipic Semialdehyde (á-AASA)

**Laboratory:** Referred from Biochemistry to the Institute of Child Health, London

**Specimen:** Spot Urine (5-10mls) on ice

**Comment:** MUST BE FROZEN immediately. Used to support a diagnosis of Pyridoxal Responsive Epilepsy. Consultant request only

**Turnaround:** 6-8 weeks

### Alpha Fetoprotein (AFP)

**Laboratory:** Clinical Biochemistry

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

**Turnaround:** 4 Days

**Ref. Range:** 0.9–8.8 µg/L

### Amikacin / Amikin

Refer to Antibiotic Assays

### Amoeba Antibodies

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** 4mL clotted blood

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

**Turnaround:** 3 weeks

**Report:** Positive or negative

### Ammonia

**Laboratory:** Clinical Biochemistry

**Specimen:** Blood sample in Li Hep or EDTA bottle

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

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

**Ref. Range:** Serum/Plasma: 10-47 umol/L

### Amphetamine

**Laboratory:** Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.

**Specimen:** Spot urine

**Comment:** See Toxicology / Drug Screen

**Turnaround:** 1 week

**Ref. Range:** See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986
Amylase (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 15mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
Ref. Range: 30 – 120 U/L

Amylase (Urinary)

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 hour urine sample
Turnaround: 1 Day
Ref. Range: 0 – 1200 IU/24 Hr

Androstenedione (D4A)

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

Angelman Syndrome (AS)

Laboratory: Molecular Genetics in Biochemistry referred to National Centre for Medical Genetics.
Specimen: Infants: 1ml EDTA blood
Adults 3-5ml EDTA blood
Turnaround: 6 weeks
Report: Sent to referring clinician by NCMG and copy of report filed in pathology

Angiotensin converting enzyme (ACE)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: 0 – 45 IU/L

Antenatal Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Screen includes Rubella IgG, Hepatitis B Surface antigen, HIV Ag/Ab, Syphilis antibody, Varicella-zoster virus (VZV) IgG
Turnaround: Negative samples: 36 hours. Please allow extra time for samples testing positive in house for HIV Ag/Ab and Syphilis antibody (external confirmatory testing required).
Report: Positive or negative (IU/mL for Rubella IgG)

Antenatal Serology

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

Laboratory: Blood Transfusion Laboratory
Specimen: 1 x 6 ml EDTA Pink Capped Tube
Comment: Antenatal blood grouping and antibody screening and identification in antenatal women. (Patients may also include the male partners of pregnant women for the purposes of establishing their blood groups and red cell phenotypes in the prediction of HDNB).
Blood Group, Antibody Screen and Identification, Red Cell Phenotyping are INAB accredited tests.
Request Form to be completed: Antenatal Serology Request Form (LF-C-
BTR-ANTENAT)

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

Ref. Range: Not applicable

### Antibiotic Assays

**Laboratory:** Microbiology  
**Specimen:** 4mL clotted blood  
**Test method:** Photometric absorbance  
**Turnaround:** Assays are batched and performed at 7am, 11am, 3pm, 7pm and 11pm. Please ensure the sample is in the laboratory at least 30 minutes before the allocated batch time.  
**Report:** Quantitative result (mg/L)  
**Comment:** Available 7 days. Specify peak (post) or trough (pre). It is very difficult to interpret random specimens. All forms should indicate the time since the last administration of the drug. Please refer to the Cork University Hospital Antibiotic Guidelines.

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

### Antibiotic - once daily dosage

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Trough</th>
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</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>$&lt;5,\text{mg/L}$</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>$&lt;1,\text{mg/L}$</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>$&lt;1,\text{mg/L}$</td>
</tr>
</tbody>
</table>

### Antibiotic - multiple dosage

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Trough</th>
<th>Peak (1 hour post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>$&lt;2,\text{mg/L}$</td>
<td>5-12 mg/L</td>
</tr>
<tr>
<td>Amikacin</td>
<td>$&lt;5,\text{mg/L}$</td>
<td>15-30 mg/L</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>$&lt;2,\text{mg/L}$</td>
<td>5-12 mg/L</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>10-20 mg/L</td>
<td>20-40 mg/L</td>
</tr>
</tbody>
</table>

### Anti Cardiolipin Antibodies

**Laboratory:** Haematology  
**Specimen:** Blood 4mL Red Vacuette® (clotted blood)  
**Comment:** Forms part of a Thrombophilia and/or Lupus screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia. Test available Mon to Fri during routine hours. This assay is only available when requested as part of Thrombophilia investigations.  
**Turnaround:** 3 - 4 weeks  
**Ref. Range:** IgG 0 - 10 GPL /mL  
IgM 0 - 7MPL /mL

### Anti-CCP

**Laboratory:** Autoimmune Serology  
**Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)  
**Comment:** Quantitative immunoassay using Phadia Immunocap 250 analyser. Test restricted to consultant requests.  
**Turnaround:** 24 Hours  
**Ref. Range:** 0 - 7 AU/mL
Anti-c Quantitation
Laboratory: Available by prior arrangement with Blood Transfusion Laboratory
Specimen: 2 x 6 mL EDTA Pink Capped Tube
Comment: Quantitations referred to: I.B.T.S., National Blood Centre, James’s St., Dublin 8.
Complete the Antenatal Serology request form LF-C-BTR-ANTENAT.
Please note 3 forms of identification are required: Name, DOB and hospital number (address acceptable if none available) on both sample and form.
Please submit samples on Mondays if possible.
Turnaround: 3 Weeks for Hard Copy reports. Verbal result from IBTS within 7 days.
Ref. Range: Refer to IBTS report

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

Anti-neuronal Antibody Testing (Paraneoplastic Antibodies)
Laboratory: Neuropathology Department
Specimen: 4.0 ml of clotted blood (red top vacuette)
Turnaround: Approximately 2 weeks.

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

Anti Neutrophil Antibodies, Granulocyte Immunology and Auto immune Neutropenia
Laboratory: Referred from Haematology to NHSBT Centre, Bristol
Specimen: Clotted specimen and EDTA 6 mls
Comment: Must arrange with Haematology, transport within 24 hours, complete form from referral laboratory
Turnaround: 64 days
Ref. Range: Not applicable

Anti Nuclear Factor
Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Part of Autoantibody Screen. Pattern reported. Titre not reported.
Turnaround: 24 Hours
Ref. Range: Not applicable
Anti-Platelet Antibody Investigation
Laboratory: Blood Transfusion Laboratory
Specimen: 3 mL Clotted (Red Capped/Yellow Ring) Tube
Comment: Samples referred to: I.B.T.S., National Blood Centre, James’s St., Dublin 8
Complete the Blood Transfusion request form.
Turnaround: 3 Weeks
Ref. Range: Not Applicable

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

Anti Thrombin 3
Laboratory: Haematology
Specimen: Blood 3mL blue Vacuette® (sodium citrate 3.2%)
(Specimens, which are haemolysed, underfilled or overfilled, cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling)
Comment: Forms part of a Thrombophilia Screen. See Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Samples must be received within 4 hours
Turnaround: 3 – 4 weeks
Ref. Range:

<table>
<thead>
<tr>
<th>Age</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>39 – 87</td>
</tr>
<tr>
<td>Day 5</td>
<td>41 – 93</td>
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<tr>
<td>Day 30</td>
<td>48 – 108</td>
</tr>
<tr>
<td>Day 90</td>
<td>73 – 121</td>
</tr>
<tr>
<td>Day 180</td>
<td>84 - 124</td>
</tr>
<tr>
<td>Adult</td>
<td>80 - 120</td>
</tr>
</tbody>
</table>

Asitic Fluid
See Sterile Body Fluid – Microscopy and Culture or Cytology

Aspartate amino Transferase (AST)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Haemolysis invalidates result
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 6 – 42 U/L

Aspergillus Antibodies
Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround: 3 weeks
Report: Quantitative result with an interpretative comment

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

Autopsy (CNS cases)

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

Avian Antibodies / Fowl

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Mycology Reference Centre, Leeds)
Turnaround: 3 weeks
Report: Quantitative result with an interpretative comment

Barbiturates

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

Bartholin’s Abscess

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

BCR ABL (Philadelphia Chromosome)

Laboratory: Haematology referred to Cancer Molecular Diagnostics, CMD, St James Hospital Dublin
Specimen: 3 mL purple Vacuette (EDTA) blood or bone marrow in 10mL RPMI. Available Mon to Thurs to reach the laboratory before 12 noon on the day of sampling
Comment: BCR-ABL associated with Ph+ CML, Ph+ ALL
**Bence-Jones protein**

**Laboratory:** Clinical Biochemistry (Immunology Laboratory)

**Specimen:** 20 mL urine

**Turnaround:** 4 Days

**Ref. Range:** Should be NEGATIVE

**Benzodiazepines**

**Laboratory:** Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.

**Specimen:** Blood: 4.0 mL blood in a plain tube (clotted sample). Urine: spot urine

**Comment:** See Toxicology / Drug Screen

**Turnaround:** 1 week

**Ref. Range:** See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01) 8093986

**Beta 2 Glycoprotein 1**

**Laboratory:** Haematology

**Specimen:** Blood 3mL red Vacuette® (serum)

**Comment:** Forms part of the Lupus and/or Thrombophilia Screen. This assay is only available when requested as part of Thrombophilia investigations.

**Turnaround:** 6 weeks

**Ref. Range:** IgG Normal: < 5U/mL

Borderline: 5-8U/mL

Elevated: >8U/mL

**Beta-2-Microglobulin**

**Laboratory:** Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories

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

**Comment:** Consultant request only

**Turnaround:** 3 weeks

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

**Bicarbonate (Plasma)**

**Laboratory:** Clinical Biochemistry

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

**Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx.

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

**Ref. Range:** 22 – 26 mmol/L.

**Bile Acids**

**Laboratory:** Clinical Biochemistry

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

**Turnaround:** 2 days

**Ref. Range:** 0-10 µmol/L

**Bilirubin Direct**

**Laboratory:** Clinical Biochemistry

**Specimen:** 4.0 mL blood in plain tube (clotted sample)
Comment: Aged sample invalidates results

**Bilirubin- Total**

**Laboratory:** Clinical Biochemistry
**Specimen:** 4.0 mL blood in plain tube (clotted sample)
**Comment:** Aged sample invalidates results
**Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
**Ref. Range:** 1 – 10 µmol/L (adult) Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

**Blood Culture**

**Laboratory:** Microbiology (Main laboratory)
**Specimen:** The blood culture vials and instrument in use are the BACTEC fluorescent system (Becton-Dickinson & Co. Ltd). An exception is the investigation for mycobacteria (see Mycobacteriology section). Blood culture vials should be kept at a cool room temperature in the wards (2-25°C). The number of vials stored in each ward should be limited to their general usage and excessive stocks avoided. There is an expiry date on each vial and they should not be used after this date.
**Adults:** Preferably, a volume of 8-10mL of specimen per vial.
**Children /neonates:** Use paediatric vials – preferably, a volume of 1-3mL (the volume of blood should be no more than 1% of the patients total blood volume). No need for lytic/anaerobic vial unless clinically indicated.
**Comment:** If blood for other tests such as blood gases or ESR is to be taken at the same venepuncture, the blood culture bottles should be inoculated first to avoid contamination. It is preferable to take blood for culture separately. Disinfect the skin at the venepuncture site with isopropyl alcohol and allow to dry. Disinfect the septum of the blood culture bottle with alcohol and allow to dry. For diagnosis of bacteraemia withdraw blood from a peripheral vein and divide the specimen equally among blood culture vials, ensuring that the needle is changed between bottles. If the patient has a central line or other vascular access site, it is often appropriate to take both central and peripheral blood cultures. For neonates consider the use of a single aerobic paediatric vial appropriate for small volumes of blood. If necrotising enterocolitis is suspected and sufficient blood is obtained, inoculate a paediatric and a lytic/anaerobic bottle.
Indicate if specific organisms are sought e.g. causative organisms of infective endocarditis. Consider bone marrow aspirate rather than blood sample for the diagnosis of typhoid fever and brucella species.

**Blood cultures should be transported to the laboratory as soon as possible after venepuncture as delays can lead to false negative results.**

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

**Turnaround:** Most organisms will be detected within 24-48 hours and normally blood cultures are incubated for 5 days, but this time may be extended e.g. 10 days if endocarditis is suspected or **7 days for bone marrow up to 21 days for slow growing organisms.**

**Report:** A provisional report is issued at 48 hours and a final report at 5 days if the blood culture is negative.

Positive results are phoned as soon as available to the requesting area or team.

| Blood Gases (pH, pCO₂, pO₂, Actual Bicarbonate, Base Excess, O₂ Saturation) |
|-------------------------------|-----------------|-----------------|-----------------|
| Laboratory:                  | Clinical Biochemistry |
| Specimen:                    | Li Hep syringe   |
| Comment:                     | If delay between sample being taken and arrival in CUH Biochemistry lab is to be greater than 15 minutes, sample must be sent on ice. |
| Turnaround:                  | 15 Minutes      |
| Ref. Range:                  | PH 7.36 – 7.44  | Actual Bicarb 22 – 26 mmol/L |
|                              | PCO₂ 4.5 – 6.1 kPa | Base Excess -2 - +2.5 mmol/L |
|                              | PO₂ 11.3 – 14.0 kPa |

<table>
<thead>
<tr>
<th>Blood Group and Coombs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory:</td>
</tr>
<tr>
<td>Specimen:</td>
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<td></td>
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<tr>
<td>Turnaround:</td>
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<table>
<thead>
<tr>
<th>Blood Group and Crossmatch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory:</td>
</tr>
<tr>
<td>Specimen:</td>
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<tr>
<td></td>
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<tr>
<td>Note:</td>
</tr>
</tbody>
</table>
Comment: Samples for crossmatching for elective surgery must arrive in the laboratory before 2 p.m. on day before surgery to avoid undue delay. Blood is crossmatched in batches and in accordance with the locally agreed Maximum Surgical Blood Ordering Schedule (MSBOS), except in exceptional cases. Arrangements are in place for the emergency issue of blood. In exceptional circumstances, blood may be issued uncrossmatched on request. Complete the Blood Transfusion request form LF-C-BTR-XMATCH. The laboratory accepts “Add-On” requests for additional units to be crossmatched when appropriate. These requests must be accompanied with a completed written Blood Product Requisition Form LF-C-BTR-PROREQ. Crossmatch is an INAB accredited test.

Turnaround: 3 Hours. (Note: The presence of irregular antibodies, or the need for certain special requirements can lead to significant delays in efforts to obtain appropriate blood).
Routine (non-urgent) samples will be processed during routine hours unless specified as an emergency.
In emergencies the laboratory will attempt to provide crossmatched blood within 40 minutes to 1 hour (when possible i.e. no antibodies). These turnaround times apply to “Add On” requests for blood also.

Ref. Range: Not Applicable

Blood Group and Hold

Laboratory: Blood Transfusion Laboratory
Specimen: 1 x 6 ml EDTA Pink Capped Tube
For Paediatrics: 1 ml EDTA (Purple Cap/White Ring) Paediatric Bottle.
Comment: Blood is grouped and an antibody screen is performed. The sample is then held in the laboratory for up to 3 weeks. Blood may be crossmatched subsequently on that sample on request.
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
Blood Group, Antibody Screen and Antibody Identification are INAB accredited tests.

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

Ref. Range: Not applicable

Blood Transfusion Reaction Investigation

Laboratory: Blood Transfusion Laboratory
Specimens: 1 x 6 ml EDTA Pink Capped Tube and 2 x 4ml clotted sample (red cap yellow ring).
Comment: Complete the Blood Transfusion request form LF-C-BTR-XMATCH.
Tests may include Blood Group, Antibody Screen, Antibody Identification, Crossmatch, Direct Coombs Test, Red Cell Phenotyping. These are all INAB accredited tests.
Ensure that the unit/product implicated in suspected transfusion reaction is returned to the laboratory as soon as possible.
Ensure the Transfusion Reaction details are completed on the last page of the Blood Component Prescription and Transfusion Record (Report of a suspected Transfusion Reaction).

Turnaround: 4 Hours.
Ref. Range: Not applicable
Bone Marrow Examination (Haematology)

Laboratory: Haematology
Specimen: Fresh bone marrow air-dried films.
Specimen must be labelled with the patient’s name, MRN and DOB and sent to the Haematology Dept. ASAP
Comment: Examinations are undertaken for the investigation of patients with leukaemia, anaemia, myeloma, lymphoma, myeloproliferative disorders, thrombocytopenia and unexplained cytopenias.
Turnaround: Urgent marrows must be labelled as such and can expect a turn around time of 24 hours. Examples of urgent include suspected acute leukaemia, ITP in a child, myeloma with renal failure. Such marrows will also have verbal results phoned to requesting team the same day. Other indications can expect a TAT of up to two weeks for completed reporting including iron staining. However significant preliminary reports will be phoned by the reporting haematologist.

Ref. Range: N/A

Bordetella pertussis Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Test performed by reference laboratory (Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU), London)
Turnaround: 2 weeks
Report: Quantitative value with interpretative comment. In the absence of recent vaccination, values greater than 70 IU/mL are consistent with recent infection.

Bordetella Species Culture (Whooping Cough)

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

Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround: 7 days
Report: Bordetella pertussis not isolated or Bordetella pertussis / parapertussis isolated.

Brain examinations (post mortem)

Laboratory: Neuropathology
Specimen: Formalin-fixed brain / spinal cord
Comment: Post-mortem brain referrals are from Consultant Pathologists, please refer to the protocol for brain referrals (Neuropathology Department Information for Users).

Turnaround: 12 weeks
Brain tumour – molecular analysis for 1p19q and MGMT methylation status

Laboratory: Neuropathology
Specimen: Brain tumour biopsy
Comment: This investigation is requested by the Neuropathologist. Processed biopsies are sent to Molecular Laboratory, Beaumont Hospital, Dublin 9.
Turnaround: 30 days but may be longer depending on case complexity

Breast Needle Core Biopsy Calcified and Non-Calcified

Laboratory: Histopathology (Diagnostic Laboratory)
Specimen: Formalin fixed tissue. Immediately place in Buffered Formal Saline and please state date and time specimen taken.
Comment: To facilitate subsequent microscopic location of calcified deposits, breast needle core biopsies should be divided into calcified and non-calcified cores when the biopsies are taken.
Note: A separate form is required for biopsies taken from the right and left side.
Non-calcified cores are placed in yellow mesh cassettes which are subsequently placed in a correctly labelled specimen container containing buffered formalin.
Calcified cores are placed in orange mesh biopsy cassettes which are subsequently placed in a correctly labelled specimen container containing buffered formalin.
Turnaround: 80% cases in 2-3 days

Bronchial/Nasal Brushings for PCD analysis

Laboratory: Histopathology (Electron Microscopy/ Renal)
Specimen: Bronchial and Nasal brushings
Comment: Contact the laboratory in advance on extension 21315, Bleep 379 or by e-mail to arrange collection of Glutaraldehyde Fixative.
Turnaround: 2 months

Bronchoalveolar Lavage Fluid Culture

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

Brucella Antibodies (IgG, IgM and Total)

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Turnaround: 3 weeks
Report: Quantitative titre provided with interpretative comment
Comment: Performed by a reference laboratory (Brucella Reference Unit (BRU), Liverpool).
Not routinely available, please contact Microbiology Medical Team.
A negative result generally excludes a diagnosis of brucellosis. Positive Brucella agglutination reactions should be regarded as supportive evidence for the diagnosis of brucellosis provided there is reasonable epidemiological and clinical evidence to suggest the diagnosis. A rising or falling titre is more significant than a single titre.

Bursa Fluid
See Sterile Body Fluid – Microscopy and Culture.

**C1 Esterase Inhibitor (Function)**

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

**C1 Esterase Inhibitor (Total)**

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

**C3 / C4 (Complement)**

Laboratory: Clinical Biochemistry (Immunology Laboratory)
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: C3: 0.87-2.0 g/L       C4: 0.19 – 0.52 g/L

**CD3 / CD4 / CD8 / CD19 / CD56 Counts**

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

<table>
<thead>
<tr>
<th>CD 3 Absolute Counts / µL</th>
<th>CD4 Absolute Counts /µL</th>
<th>CD8 Absolute Counts /µL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Day 6</td>
<td>900</td>
<td>5,000</td>
</tr>
<tr>
<td>Month 2</td>
<td>2,800</td>
<td>7,000</td>
</tr>
<tr>
<td>Year 2</td>
<td>1,600</td>
<td>6,700</td>
</tr>
<tr>
<td>Year 5</td>
<td>900</td>
<td>4,500</td>
</tr>
<tr>
<td>Year 10</td>
<td>700</td>
<td>4,200</td>
</tr>
<tr>
<td>Year 16</td>
<td>700</td>
<td>3,50</td>
</tr>
<tr>
<td>Adult</td>
<td>690</td>
<td>2,540</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CD 19 Absolute Counts / µL</th>
<th>CD 56 Absolute Counts / µL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Low</td>
</tr>
<tr>
<td>Day 6</td>
<td>200</td>
</tr>
</tbody>
</table>
C Peptide
Laboratory: Clinical Biochemistry
Specimen: 2.0 mL blood in a plain tube (clotted sample) at 4°C.
Comment: Consultant request only. Urgents available on request
Turnaround: 7 days
Ref. Range: C-peptide levels should be appropriate to the glucose level at the time the sample was taken. Glucose should always be measured at the same time as the C-peptide to facilitate interpretation of results

CA 125
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)
Turnaround: 4 Days
Ref. Range: 0 – 35 kU/L

CA 15-3
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in a plain tube (clotted sample)

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

CA 19-9
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)

Turnaround: 4 Days
Ref. Range: < 37 kU/L

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

Calcium (Blood)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Aged samples may invalidate result.
Turnaround: A/E or urgent sample: ~ 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: ~ 3 hours approx. GP or OPD: Results posted within 4 days.
Ref. Range: 2.10 – 2.65 mmol/L (Adults) Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

Calcium (Urinary)
Laboratory: Clinical Biochemistry
Specimen: 24 Hr acidified sample
<table>
<thead>
<tr>
<th>Test</th>
<th>Laboratory</th>
<th>Specimen</th>
<th>Turnaround</th>
<th>Ref. Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calcium: Creatinine Clearance</strong></td>
<td>Clinical Biochemistry</td>
<td>Spot urine sample and clotted blood sample</td>
<td>1 day</td>
<td>2.5 – 7.5 mmol/24hours</td>
<td></td>
</tr>
<tr>
<td><strong>Calcium Sensing Receptor (CASR) Mutation analysis</strong></td>
<td>Referred from Molecular Genetics Lab in Biochemistry to Oxford NHS (via NCMG)</td>
<td>3-5ml EDTA blood</td>
<td>8 weeks</td>
<td></td>
<td>Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.</td>
</tr>
<tr>
<td><strong>Calprotectin</strong></td>
<td>Referred from Biochemistry to City Hospital, Birmingham</td>
<td>5-10mg stool</td>
<td>2 weeks</td>
<td></td>
<td>Test helps distinguish IBD from IBS</td>
</tr>
<tr>
<td><strong>Cannabis</strong></td>
<td>Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.</td>
<td>Spot urine</td>
<td>1 week</td>
<td></td>
<td>See Toxicology / Drug Screen</td>
</tr>
<tr>
<td><strong>CAPD</strong></td>
<td>See Continuous Ambulatory Peritoneal Dialysis Fluid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carbamazepine</strong></td>
<td>Clinical Biochemistry</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
<td>1 Day</td>
<td>Therapeutic Range 4 – 12 mg/L, Alert range &gt;25mg/L</td>
<td></td>
</tr>
<tr>
<td><strong>Carbapenemase Producing Enterobacterales</strong></td>
<td>Microbiology (Main laboratory)</td>
<td>Rectal swabs, placed in charcoal containing transport media.</td>
<td>Prelim: 36 hours; Final: 72-96 hours</td>
<td></td>
<td>Test performed Monday to Friday 9-5pm. Label all Microbiology forms with CPE SCREEN. Indicate if the patient was previously CPE positive or CPE contact. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.</td>
</tr>
</tbody>
</table>
Carbapenamase Producing Enterobacteriales PCR

Laboratory: Microbiology (Main laboratory)
Specimen: Rectal swab, placed in PCR transport media. Contact Microbiology Laboratory for appropriate sterile transport swabs. **Specimens are only processed where there is prior agreement with the Consultant Microbiologist or the Infection Control Team.**
Comment: Test performed Monday to Friday 9-5pm. Label all Microbiology forms with CPE SCREEN. Indicate if the patient was previously CPE positive or CPE contact. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.
Turnaround: Final Result: 24 hours.

Carboxyhaemoglobin

Laboratory: Clinical Biochemistry
Specimen: Li Hep syringe
Turnaround: 1 hour 15 mins
Ref. Range: < 1.5%  Smokers: < 5%  Heavy smokers: < 9%

Cardiothoracic specimens

Laboratory: Histopathology
Specimen: Cardiothoracic
Comment: All cardiothoracic specimens must be delivered directly to Histopathology laboratory reception without delay. Optimal fixation in Buffered Formalin Saline (BFS) ensures preservation of antigenicity. Prolonged fixation may adversely affect subsequent laboratory test results.

**Optimal fixation times**
- Small biopsy samples – 6 - 12 hours
- Larger surgical specimens- 8-18 hours
Lung resection specimens are inflated upon receipt to assist penetration of fixative; delay in delivery adversely affects inflation and fixation. Tissue should not be removed from resection specimens, for research purposes or otherwise, without prior consultation with a Pathologist. Where specimens are orientated by/with sutures, their designation should be clearly detailed on the accompanying request Form.

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

Carnitine, Free & Total

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

Catecholamines – Urine

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

Laboratory: Microbiology (Main laboratory)
Specimen: Disinfect the skin around the cannula entry site, remove cannula using aseptic technique, and cut off 4cm of the tip into a sterile container using sterile scissors. The specimen should be collected into a clean, sterile, leakproof container and should be transported ASAP to prevent drying. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

Comment: Not routinely processed, if required please contact the medical team. If infection considered clinically likely please take blood cultures through the cannula.
The routine culture of devices removed for other reasons is unnecessary. Urine catheters are not cultured since growth represents distal urethral culture. A urine specimen is more appropriate. Skin disinfection procedures depend on local protocols and may vary.

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

Ref. Range: Culture: Any clinically significant isolate with the appropriate sensitivities.

CEA

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

Ref. Range: 0 – 5 ug/L

Centromere B Protein

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa assay. Specific assay undertaken following Positive Anti ENA Screen.

Turnaround: 72 Hours

Ref. Range: Not applicable

Cerebrospinal Fluid (CSF) - Culture and Microscopy

Laboratory: Microbiology (Main laboratory)
Specimen: Ideally, the laboratory should receive a minimum volume of 1mL in a universal container. The specimen should be collected into a clean, sterile, leakproof container.

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

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

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

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

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

**Turnaround:**
- Microscopy: Within 2 hours of receipt. Urgent positive report telephoned when available.
- Culture: Prelim: 24 hours; Final: 48-72 hours. Culture may be prolonged for fungal investigation if required (up to 14 days)

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

**Normal CSF cell counts**

<table>
<thead>
<tr>
<th>Leucocytes</th>
<th>Neonates &lt; 28 days old</th>
<th>0-30 cells/cmm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants 1-12 months</td>
<td>0-15 cells/cmm</td>
<td></td>
</tr>
<tr>
<td>Children/adult &gt; 1 year</td>
<td>0-5 cells/cmm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Erythrocytes</th>
<th>No RBC’s should be present in a normal CSF</th>
</tr>
</thead>
</table>

A WBC: RBC ratio of 1:500 is generally regarded as not indicative of infection

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

A differential leucocyte count is reported where sufficient cells are counted ≥ 20 WBC s/cmm. Cell counts <20 WBC/cmm the predominating WBC will be reported with comment insufficient WBC for accurate differential. Cell counts are not performed on specimens containing a clot, which would invalidate the cell count.

**Culture:** Any organism isolated with the appropriate sensitivity results.
Cerebrospinal Fluid (CSF) - Cytology

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

Cerebrospinal Fluid (CSF) – Glucose

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

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

Laboratory: Referred from Haematology Dept. to Haem. St. James hospital, Dublin 8
Specimen: RPMI-heparin medium is stored in the haematology Dunmanway day unit, once the CSF is added the samples are to be sent directly to the haematology laboratory.
Comment: Test available Monday- Friday during routine working hours CSF immunophenotyping is for diagnosis of primary CNS lymphoma or CNS involvement by Leukaemia/lymphoma only. Samples from patients with non haematological diagnoses will not be tested. CSF samples for flow cytometry must be taken directly into RPMI-heparin. CSF samples are extremely labile and samples not received in RPMI-heparin and will not be processed if greater than 1 hour old irrespective of Microbiology or Cytology cell counts
Turnaround: 3 - 6 days
Ref. Range: See referral laboratory report

Cerebrospinal Fluid (CSF) – Oligoclonal bands

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 0.5 mL CSF and 4.0 mL blood in plain tube (clotted sample)
Turnaround: 2 weeks
Ref. Range: Oligoclonal Bands should be NEGATIVE

Cerebrospinal Fluid (CSF) – Protein

Laboratory: Clinical Biochemistry
Specimen: 1.5 mL CSF specimen
Comment: Presence of blood in sample will affect results
Turnaround: 1 hour 15 mins
Ref. Range: 200 – 400 mg/L

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

Laboratory: Neuropathology
Specimen: 2-3 mL clear CSF in a universal container. CSF should be transported as soon as possible to Neuropathology for freezing. If there is delay in sending the sample to the laboratory it should be stored at 4°C. Details of storage conditions should be recorded on the form.

The information regarding suspected Prion disease MUST be indicated on the request form.

Blood-stained samples are not suitable. EEG results must be available before the sample is analysed.

Comment: Specimens are referred to the UK CJD Surveillance Centre, Edinburgh, Scotland.

Specific request forms provided by the CJD surveillance unit in Edinburgh are available from the Neuropathology office (22520) and on Q-pulse. These incorporate the clinical information required to interpret the results and must accompany the CSF specimens.

Turnaround: Approx. 20 days from the time of dispatch to CJD Surveillance Unit.

(Specimens dispatched on receipt in Neuropathology)

Cerebrospinal Shunts

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

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

Turnaround: Prelim: 24 hours; Final: 48-72 hours, culture may be prolonged for fungal /anaerobic investigation if required (up to 5 days).

Ref. Range: If pus is clearly seen, a Gram stain is performed.

In the absence of a concurrent CSF and if there is sufficient CSF visible in the shunt tubing or reservoir the numbers of WBCs/cmm and RBCs/cmm are reported.

Culture: Any clinically significant isolate with the appropriate sensitivities.

Cerebrospinal Fluid (CSF) – Spectrophotometry (Xanthochromia)

Laboratory: Clinical Biochemistry
Specimen: 1.0 mL CSF specimen
Comment: Sample must be light protected. Please use the specific request form.

Turnaround: 24 hours (weekdays only)

Ref. Range: Ring laboratory for interpretation

Ceruloplasmin

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

Turnaround: 4 Days

Ref. Range: 0.14-0.25 g/L

Cervical Swab for Microbiology

Refer to Genital swab
Chikungunya Antibodies

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

Chlamydia psittaci Antibodies

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

Chlamydia trachomatis

Laboratory: Microbiology
Specimen: Nucleic acid amplification method. Appropriate PCR STD Specimen Collection and Transport Kits must be used. Please read the kit insert for information on specimen collection and associated limitations.
Comment: Test available Monday to Friday 9-5pm.
The assay is verified for use with female Endocervical swab specimens, High Vaginal Swab specimens and male/female Urine specimens. (These specimens will also be tested for Neisseria gonorrhoea DNA).
The preferred specimen type for Chlamydia testing in female patients is urine due to increased sensitivity and fewer problems during specimen processing.
Underfilled or overfilled Urine specimen containers are unsuitable for testing.
Endocervical/HVS specimen tubes with no swab or with two swabs cannot be tested.
Flocked swabs are suitable only for Endocervical samples (this is the thinner of the 2 swabs in the sample collection kit). Use woven swabs provided for all other sites.
Specimens that appear bloody or have a dark brown colour are unsuitable for testing (may give false negative results).
The presence of mucous may inhibit PCR and cause false negative test results. Mucous free specimens are required for optimal test performance. Do not use collection devices beyond their expiry date.
Turnaround: 96 - 120 hours
Report: RT: PCR Chlamydia trachomatis Target Not Detected or Target Detected
A Target Not Detected result does not automatically exclude infection from Chlamydia trachomatis as the level of DNA present may be lower than the limit of detection of the assay.
The assay is only verified for use with female Endocervical/HVS swab specimens and male/female Urine specimens. Results from other specimen types should be interpreted with caution.

Chloride (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 95 – 107 mmol/L
Chloride (Urinary)

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

Cholesterol

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Fasting sample required
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: Total Cholesterol Target Values: <5.0 mmol/L

Cholinesterase: Phenotyping And Genotyping

Laboratory: Sample referred from Clinical Biochemistry to, Cholinesterase Investigation Unit, Department of Clinical Biochemistry, North Bristol NHS Trust, Southmead Hospital, Bristol BS10 5NB, UK
Specimen: 4.0 mL EDTA whole blood
Comment: Sample should NOT be taken during Sux-induced after apnoea as the presence of the drug can lead to erroneously low enzyme activity. Test request should be delayed for 24 hours and for 6 weeks if fresh frozen plasma is administered.
Turnaround: 1 month
Ref. Range: Contact Biochemistry (ext 22531)

Chromosome Analysis / Karyotype <5 years old

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

Chromosome Analysis / Karyotype >5 years old

Laboratory: Referred from Molecular Genetics Lab in Biochemistry via Med lab Path to the Doctor’s Lab, London (TDL).
Samples sent Mon-Thurs or by special arrangement before 9.30am on Fridays (contact ex 22531 to discuss).
Specimen: DO NOT refrigerate specimens.
Adults: 3mL Lithium Heparin blood
Infants: 1mL Lithium Heparin blood
Comment: Please use consent form available at http://www.sonichealthcare.ie/test-information/request-forms.aspx
Please note: invoices are issued directly to referring clinician.
Turnaround: 5-15 days
Report: Report sent to referring clinician and copy of report filed in pathology
Citrate (Urinary)
Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 24 hour urine, must be frozen < 30 minutes post collection
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to date referral test information.

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

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

CLL Prognostic Markers (TP53 and IGVH mutation status)
Laboratory: Referred from Haematology Dept to Royal Marsden Hospital UK
Specimen: Blood 3 mL purple Vacuette (EDTA) 5 -10 mLs required and 3 mL green Vacuette ( Lithium Heparin)
Available Mon – Thurs, sample to reach Haematology Lab by 12 noon on day of sampling.
Comment: Prognostic markers for CLL
Turnaround: 60 days
Report: See referral laboratory report
Coagulation Factor VIII Inhibitors – Quantitation Assay

Laboratory: Haematology
Specimen: Blood 3mL x2, blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed
check coagulation sample bottles are not expired to ensure correct filling.
Comment: Test available Monday to Friday, during routine working hours by
arrangement with the Haematology dept. Quantitation of coagulation
factor inhibitors reported in Bethesda Units. One Bethesda Unit is the
amount of inhibitor in 1 mL of plasma that will neutralise 50% of the clotting
factor activity.
Samples must be received within 4 hours
Turnaround: 2 – 4 weeks
Ref. Range:
Weak Factor Inhibitor: ≤ 10 BU/mL.
Strong Factor Inhibitor: > 10 BU/mL.

Coagulation Factor Inhibitor Screen

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

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

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

Coeliac Screen
Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Includes IgA Anti-tTG plus IgA Anti-EMA if Anti-tTG Positive.
IgA deficient sera automatically detected on Anti-tTG assay. Deficient sera are analyzed for total serum IgA. IgA deficient sera are tested for IgG Anti-EMA antibodies.
Turnaround: 24 Hours
Ref. Range: 0 - 5 AU/mL
### Cold Agglutinins

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

### Conjunctivitis

See Eye Swab.

### Connexin (DFNB1) Mutation analysis

**Laboratory:** Referred from Molecular Genetics Lab in Biochemistry to Leeds NHS (via NCMG)  
**Specimen:** 3-5ml EDTA  
**Comment:** Use NCMG request form with consent available from www.genetics.ie  
Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.  
**Turnaround:** 40 days  
**Report:** Sent to referring clinician and copy filed in pathology

### Continuous Ambulatory Peritoneal Dialysis Fluid

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

### Copper

**Laboratory:** Clinical Biochemistry  
**Specimen:** 4.0 mL blood in plain metal-free tube (Lithium Heparin)  
**Turnaround:** 1 week  
**Ref. Range:** 11 – 24 µmol/L

### Copper (Urinary)

**Laboratory:** Referred from Clinical Biochemistry to SAS Laboratory for Trace Elements, Guildford.  
**Specimen:** 24 hr urine sample  
**Comment:** N.B. Use designated 24 hr urine container only  
**Turnaround:** 3 weeks  
**Ref. Range:** Contact Clinical Biochemistry laboratory
### Corneal Scrapings

See – Intraocular fluids / Corneal Scrapings

### Cortisol

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 Days</td>
</tr>
</tbody>
</table>
| Ref. Range: | • Cortisol AM: 101-536 nmol/L  
• Cortisol PM: 79-478 nmol/L |

### Cortisol (Urinary)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Referred from Clinical Biochemistry to Biochemistry Laboratory in the Mater Hospital, Dublin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>24 Hour urine collection</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>2 Weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>100 - 379 nmol/24 Hr</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Performed by a reference laboratory (Rare &amp; Imported Pathogens Laboratory (RIPL), Porton Down)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Creatine Kinase (CK)

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

### Creatinine (Blood)

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

### Creatinine (Urinary)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>24 hour sample for creatinine clearance (Spot sample for microalbumin / creatinine ratio, see below)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 Day</td>
</tr>
</tbody>
</table>
| Ref. Range: | Male: 8000 – 17700 µmol/24 Hr  
Female: 7000 – 154000 µmmol/24 Hr |

### Creatinine Clearance

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimens:</td>
<td>4.0 mL blood in a plain tube (clotted sample) and a 24-hour urine sample.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 Day</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>60 – 120 mls/min</td>
</tr>
</tbody>
</table>
### CRP

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in a plain tube (clotted sample)
- **Comment:** Only done when appropriate clinical details are provided. This assay is not suitable for the stratification of risk of vascular disease.
- **Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
- **Ref. Range:** 0.0-5.0mg/L

### Cryoglobulin

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

### Cryptococcal Antigen

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood, CSF (0.3mL minimum)
- **Comment:** Performed by a reference laboratory (Mycology Reference Centre, Leeds)
- **Turnaround:** 3 weeks
- **Report:** Negative or Positive (Titre)

### Cryptosporidium Species

- **Laboratory:** Microbiology (Category 3 Laboratory)
- **Specimen:** Faeces.
  Performed routinely on all suitable faeces samples submitted for Routine Molecular Enteric Screening.
  Other types of clinical specimen such as duodenal aspirates are also stained for cryptosporidia.
- **Comment:** Test performed routinely Monday to Friday 9-5pm. Diagnosis is based upon the molecular detection of *Cryptosporidium parvum/hominis* and demonstration of oocysts in faeces samples using a modified Ziehl-Neelsen stain.

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

- **Turnaround:** 36 hours.
- **Report:** PCR for Cryptosporidium parvum/hominis: Target DETECTED or target NOT detected.
  Oocysts of *Cryptosporidium* seen or not seen

### CSF

See Cerebrospinal Fluid

### CSF Oligoclonal bands and CSF IgG Index

See Cerebrospinal Fluid - Oligoclonal bands and CSF IgG Index
CSF Viral Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: CSF (>0.5mL)
Comment: Molecular tests for Enterovirus, Herpes Simplex virus (HSV1/2), Varicella-zoster virus (VZV). For patients <3 years of age, Human Herpes virus 6 (HHV-6) and Parechovirus also included in screen.
Testing performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).

Turnaround: 5 working days
Report: Detected or not detected

CSU - Catheter Urine

See Urine Microscopy and Culture

Cyclosporin (Neoral)

Laboratory: Clinical Biochemistry
Specimen: Trough sample required, (Blood 3mL, EDTA). Analysed on Thursdays
Turnaround: 1–2 Days
Ref. Range: Patient specific Interpretation of Cyclosporin is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy and other drug therapy and method of measurement.

Cystic Fibrosis (CF)

Laboratory: Specimens referred from Molecular Genetics Lab in Biochemistry to NCMG.
Specimen: Adults: 3-5 ml EDTA blood,
Infants: 1ml EDTA blood
Patient Information Request (PIR) form for carrier status in CF families available from www.genetics.ie

Turnaround: 6-8 weeks
Report: Sent to referring clinician by NCMG and copy of report filed in pathology

Cytological Examination

Laboratory: Histopathology (Cytology Department)
Specimen: Cerebrospinal Fluid (CSF) - Cytology
See Cerebrospinal Fluid

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

An FNA clinic accepting GP referrals for patients with palpable swellings is available on Thursday afternoons. A Consultant FNA Referral form needs to be completed and faxed/sent to the laboratory to arrange an appointment. This form is available in the CUH Staff Directory under CUH Forms or alternatively, by contacting 021 4922883/4922510.

Assistance to those performing FNAs in radiology is available before 4.30pm Monday to Friday. The service must be pre-booked with the Cytopathology laboratory @ Ext.22511.

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

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

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

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

Ref. Range: Not applicable.

Cytomegalovirus (CMV) IgG and IgM

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

Turnaround: 36 hours
Report: Positive or negative

Cytomegalovirus (CMV) Molecular

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL EDTA blood, urine, CSF, stool, pleural fluid, broncho-alveolar lavage, nasopharyngeal aspirate, blood spot (Guthrie card), amniotic fluid
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Plasma must be frozen by laboratory within 24 hours of sample collection.

Turnaround: 5 working days
Report: Detected or not detected

Cytotoxic (Donor-specific) Antibodies

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

Turnaround: Contact Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.

D-dimers

Laboratory: Haematology
Specimen: Blood 3mL, blue Vacuette® (sodium citrate 3.2%)
Specimens must be received within 24 hours of phlebotomy.
Comment: The presence of cross-linked D-dimer domain is diagnostic for lysis of a fibrin clot. Test available Monday to Friday during routine working hours, and for emergency reasons at all other times.

Turnaround: Emergency specimens: 3 hours; Routine specimens: 8 hours
Ref. Range: Negative: 0 – 0.5 mg/L FEU  
Positive: > 0.5 mg/L FEU

**Dengue Virus IgG and IgM**  
Laboratory: Microbiology (Infectious Diseases Serology)  
Specimen: 4mL clotted blood  
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)  
Turnaround: 2 weeks  
Report: Positive or negative

**Dermatophytosis**  
See Mycology

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

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

**Digoxin**  
Laboratory: Clinical Biochemistry  
Specimen: 4.0 mL blood in plain tube (clotted sample)  
Comment: Samples for Digoxin must be taken at least 6 hours post dose. Range quoted is appropriate for a minimum 6 hours post dose sample.  
Turnaround: Daily, urgent samples prioritised  
Ref. Range: Therapeutic Range 0.5-1.0 μg/L  
Toxic > 2.4 μg/L

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

**Direct Coombs Test**  
Laboratory: Blood Transfusion Laboratory  
Specimen: 3 mL Purple Capped (FBC) Tube.  
For Paediatrics: 1 mL EDTA (Purple Cap/White Ring) Paediatric Bottle.  
Comment: Investigation to demonstrate whether red cells are coated in vivo with immunoglobulins and/or complement.  
Complete the Blood Transfusion request form LF-C-BTR-XMATCH.  
This is an INAB accredited test.  
Turnaround: 3 Hours  
Ref. Range: Negative or Positive (IgG, IgA, IgM, C3c, C3d).

**Direct Immunofluorescence – Renal Biopsy**  
See Renal Biopsy
Direct Immunofluorescence – Skin/Oral Mucosa

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

Turnaround: 6-7 days

ds-DNA Elisa

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

Turnaround: 72 Hours
Ref. Range: 0 - 200 IU/mL

Duodenal Aspirate

Laboratory: Microbiology (Parasitology)
Specimen: Specimens will be obtained by specialist collection according to local protocols. The specimen volume may vary - ideally, a minimum volume of 1 mL should be sent to the lab. A screw-capped sterile universal container is practical for this purpose. Transport specimens ASAP. If processing is delayed do NOT refrigerate specimen, leave at room temperature. Delays of over 48h are undesirable.
Comment: Test performed Monday to Friday 9-5pm. Fluid from the duodenum is examined for the presence of Strongyloides stercoralis larvae, Giardia lamblia trophozoites, Cyclospora, and Isospora belli. Duodenal fluid is also examined for the presence of Microsporidia where specifically requested or where the patient is immunocompromised.

Turnaround: 24 hours. Microsporidia investigation referred to Reference laboratory. (turnaround time varies)
Report: Report on any parasites seen. Where possible the organism is reported to species level and the stage identified (trophozoite, cyst, oocyst, etc).

Ear Swab

Laboratory: Microbiology (Main laboratory)
Specimen: Swab any pus or exudate.
Comment: Test performed routinely Monday to Friday 9-5pm. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at room temperature. Typanocentesis (needle aspiration) and Myringotomy (surgical incision of tympanic membrane), to specimen middle ear effusion, is rarely justified.

Turnaround: Prelim: 24 hours; Final: 48-72 hours
Report: Culture report: Any clinically significant isolate with the appropriate sensitivities.

Echinococcus (Hydatid cyst) Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London)

Turnaround: 3 weeks
Report: Positive or negative
**E. coli 0157 Serology**

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

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**E. coli PCR**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>CSF (0.5mL)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Performed by Irish Meningitis &amp; Sepsis Reference Laboratory (IMSRL), Dublin. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Samples received by IMSRL before 11am, result between 4pm and 5pm the same day</td>
</tr>
<tr>
<td>Report:</td>
<td>Detected or not detected</td>
</tr>
</tbody>
</table>

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**EGFR, ALK, BRAF, KRAS & NRAS**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Molecular Pathology: Molecular testing in the pathology laboratory CUH is performed on request from Consultant Histopathologists on FFPET samples from patients with Lung cancer, colon cancer and melanoma. The current repertoire of PCR tests includes, EGFR with reflex ALK, BRAF, KRAS &amp; NRAS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Histopathology Tissue Block</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>5-10 working days</td>
</tr>
</tbody>
</table>

---

**EGFR (cfDNA Plasma)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Molecular Pathology: EGFR cfDNA Plasma Molecular testing in the pathology laboratory CUH is performed on request from Consultant Histopathologists on plasma samples from patients with Lung cancer. The cut-off for receipt of these samples into the laboratory is 15:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>2 K2 EDTA Blood tubes</td>
</tr>
<tr>
<td>Comment:</td>
<td>Please contact the laboratory prior to taking the sample at Ext.22513 /22792 Deliver to the molecular pathology laboratory and hand directly to the Medical Scientist.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>5-10 working days</td>
</tr>
</tbody>
</table>

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**Electron Microscopy**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Histopathology (EM Dept.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Fresh unfixed tissue and brushings (For renal biopsies see Renal Biopsy)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Specimens are accepted Mon – Fri 8am to 3:30pm Please contact the laboratory in advance of the procedure at Ext. 21315 or bleep 379, to organise collection of appropriate specimen container and fixative. Tissue samples for EM should be brought immediately to the laboratory and handed directly to a Medical Scientist.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>4-6 weeks</td>
</tr>
</tbody>
</table>

Note: For PCD specimens, the clinicians collect the appropriate fixative from the laboratory staff in the EM lab.
**EMA (Endomyosal Antibodies)**

- **Laboratory:** Autoimmune Serology
- **Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)
- **Comment:** Immunofluorescence test using Primate Oesophagus as substrate. Part of Coeliac Screen. Confirmatory assay following Positive IgA Anti-tTG screen.
- **Turnaround:** 24 Hours
- **Ref. Range:** Not applicable

**Erythrocyte Membrane Analysis EMA for Hereditary Spherocytosis**

- **Laboratory:** Specimen referred from Haematology to Haematology, Our Lady’s Hospital Crumlin, Dublin 12
- **Specimen:** Blood 3mL, purple, Vacuette® (EDTA) Available Mon to Thurs only, to reach laboratory by 12 noon, Time of phlebotomy must be stated on form.
- **Comment:** Requested by Consultant Haematologist
- **Turnaround:** 28 days
- **Report:** See referral laboratory report

**ENA Screen (Extractable Nuclear Antigens)**

- **Laboratory:** Autoimmune Serology
- **Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)
- **Comment:** Qualitative Immunoassay using Phadia Unicap 250 analyser. Screening assay for antibodies to Ro, La, U1RNP, Sm, SCL-70 & Jo-1. Undertaken on all positive ANF sera.
- **Turnaround:** 72 Hours
- **Ref. Range:** Not applicable

**Endocervical Swab**

Refer to Genital swab

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

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

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

**Epstein-Barr Virus (EBV) IgG and IgM**

Laboratory: Microbiology (Infectious Diseases Serology)  
Specimen: 4mL clotted blood  
Comment: EBV IgM (VCA) performed in-house.  
EBV IgG (VCA and NA) testing is performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).  
Turnaround: 36 hours for EBV IgM, 5 working days for EBV IgG  
Report: Positive or negative

**Epstein-Barr Virus (EBV) Molecular**

Laboratory: Microbiology (Infectious Diseases Serology)  
Specimen: 4mL EDTA blood  
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Plasma must be frozen by laboratory within 24 hours of sample collection.  
Turnaround: 5 working days  
Report: Detected or not detected

**Erythropoietin**

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

**ESR Erythrocyte Sedimentation Rate**

Laboratory: Haematology  
Specimen: Fresh blood 3mL purple Vacuette (EDTA), specimen must be <12 hours old from the time of phlebotomy. Minimum volume of sample required for ESR is 1.4 mL.  
Comment: ESR Measurement is a non-specific test of inflammation and tissue damage. Test available Mon to Fri during routine working hours.  
Turnaround: Urgent specimens: <2 hours (when laboratory informed); Routine ward specimens: 8 hours, GP Specimens: 2 days  
Ref. Range: Males: 0 – 10mm/ hour Females: 0 – 20mm/hour
Eye Swab

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

Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround: Prelim: 24 hours; Final: 48-72 hours.
Report: Culture report: Any clinically significant isolate with the appropriate sensitivities.

Factor I (see Fibrinogen)
Laboratory: Haematology

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

Comment: Determines the activity of coagulation Factor II (Prothrombin).
Test available Monday to Friday, during routine working hours.

Samples must be received within 4 hours

<table>
<thead>
<tr>
<th>Turnaround:</th>
<th>2 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. Range:</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Mean (IU/mL)</td>
</tr>
<tr>
<td>Day 1</td>
<td>0.48</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.63</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.68</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.75</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.88</td>
</tr>
<tr>
<td>Adult</td>
<td>1.08</td>
</tr>
</tbody>
</table>

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

Comment: Determines the activity of coagulation Factor V. Test available Monday to Friday, during routine working hours, by arrangement with the Haematology Laboratory.

Samples must be received within 4 hours

<table>
<thead>
<tr>
<th>Turnaround:</th>
<th>2 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. Range:</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Mean (IU/mL)</td>
</tr>
<tr>
<td>Day1</td>
<td>0.72</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.95</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.98</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.90</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.91</td>
</tr>
<tr>
<td>Adult</td>
<td>1.06</td>
</tr>
</tbody>
</table>
Factor V Leiden Mutation (G1691A)

Laboratory: Haematology Molecular Genetics
Specimen: Blood 3mL purple Vacuette® (EDTA) N.B. Separate EDTA sample necessary if FBC also requested, citrate specimen also required for APC Resistance
Comment: If the APC Resistance screening test for Factor V Leiden (which forms part of the thrombophilia screen) is positive it is confirmed by PCR analysis in the Haematology Genetics laboratory.
See Main Haematology Section on Guidelines for Investigation of Thrombophilia.
Turnaround: 6 - 8 weeks
Ref. Range: Normal / Heterozygous / Homozygous, see Laboratory report

Factor VII

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%). Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment: Determines the activity of coagulation Factor VII. Test available Monday to Friday, during routine working hours, by arrangement with the Haematology Laboratory.
Samples must be received within 4 hours
Turnaround: 2 weeks
Ref. Range:

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>0.66</td>
<td>0.28 - 1.04</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.89</td>
<td>0.35 - 1.43</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.90</td>
<td>0.42 - 1.38</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.91</td>
<td>0.39 - 1.43</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.87</td>
<td>0.47 - 1.27</td>
</tr>
<tr>
<td>Adult</td>
<td>1.05</td>
<td>0.67 - 1.43</td>
</tr>
</tbody>
</table>

Factor VIII

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%). Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment: Determines the activity of coagulation Factor VIII. Test available Monday to Friday by arrangement, during routine working hours, emergency requests out of routine hours always requires prior Haematology Consultant approval and planning.
Samples must be received within 4 hours
Turnaround: Emergency specimens < 4hours; Routine specimens 14 days.
Ref. Range:

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.14</td>
<td>0.50 - 1.78</td>
</tr>
<tr>
<td>Day 5</td>
<td>1.02</td>
<td>0.50 - 1.54</td>
</tr>
<tr>
<td>Day 30</td>
<td>1.03</td>
<td>0.50 - 1.57</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.87</td>
<td>0.50 - 1.25</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.79</td>
<td>0.50 - 1.09</td>
</tr>
<tr>
<td>Adult</td>
<td>0.99</td>
<td>0.50 - 1.49</td>
</tr>
</tbody>
</table>
### Factor VIII Chromogenic

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

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

**Comment:** By arrangement with laboratory

**Samples must be received within 4 hours**

**Turnaround:** 84 days

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

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>0.53</td>
<td>0.15 - 0.91</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.53</td>
<td>0.15 - 0.91</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.51</td>
<td>0.21 - 0.81</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.67</td>
<td>0.21 - 1.13</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.86</td>
<td>0.36 - 1.36</td>
</tr>
<tr>
<td>Adult</td>
<td>1.09</td>
<td>0.55 - 1.63</td>
</tr>
</tbody>
</table>

### Factor IX

**Laboratory:** Haematology

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

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

**Samples must be received within 4 hours**

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

**Ref. Range:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>0.53</td>
<td>0.15 - 0.91</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.53</td>
<td>0.15 - 0.91</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.51</td>
<td>0.21 - 0.81</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.67</td>
<td>0.21 - 1.13</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.86</td>
<td>0.36 - 1.36</td>
</tr>
<tr>
<td>Adult</td>
<td>1.09</td>
<td>0.55 - 1.63</td>
</tr>
</tbody>
</table>

### Factor X

**Laboratory:** Haematology

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

**Comment:** Determines the activity of coagulation Factor X. Test available Monday to Friday, during routine working hours, by arrangement with the Haematology Laboratory.

**Samples must be received within 4 hours**

**Turnaround:** 2 weeks

**Ref. Range:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
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<tbody>
<tr>
<td>Day 1</td>
<td>0.44</td>
<td>0.21 - 0.68</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.49</td>
<td>0.19 - 0.79</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.59</td>
<td>0.31 - 0.87</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.67</td>
<td>0.35 - 0.99</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.71</td>
<td>0.35 - 1.07</td>
</tr>
<tr>
<td>Adult</td>
<td>1.11</td>
<td>0.70 - 1.52</td>
</tr>
</tbody>
</table>
Factor XI

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment: Determines the activity of coagulation Factor X1 Test available Mon to Fri, during routine hours, by arrangement with the Haematology Laboratory.
Samples must be received within 4 hours

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>0.38</td>
<td>0.10 - 0.66</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.55</td>
<td>0.23 - 0.87</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.53</td>
<td>0.27 - 0.79</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.69</td>
<td>0.41 - 0.97</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.91</td>
<td>0.49 - 1.34</td>
</tr>
<tr>
<td>Adult</td>
<td>0.97</td>
<td>0.67 - 1.27</td>
</tr>
</tbody>
</table>

Factor XII

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment: Determines the activity of coagulation Factor X11. Test available Mon to Fri, during routine hours, by arrangement with the Haematology Laboratory.
Samples must be received within 4 hours

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>0.53</td>
<td>0.13 - 0.93</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.47</td>
<td>0.11 - 0.83</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.49</td>
<td>0.17 - 0.81</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.67</td>
<td>0.25 - 1.09</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.77</td>
<td>0.39 - 1.15</td>
</tr>
<tr>
<td>Adult</td>
<td>1.08</td>
<td>0.52 - 1.64</td>
</tr>
</tbody>
</table>

Factor XIII

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
Comment: A qualitative assay to diagnose congenital deficiency. Test available Mon – Thurs,(due to incubation requirements) during routine hours.
Samples must be received within 4 hours

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (IU/mL)</th>
<th>Range (IU/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.08</td>
<td>0.52 - 1.64</td>
</tr>
<tr>
<td>Day 5</td>
<td>0.47</td>
<td>0.11 - 0.83</td>
</tr>
<tr>
<td>Day 30</td>
<td>0.49</td>
<td>0.17 - 0.81</td>
</tr>
<tr>
<td>Day 90</td>
<td>0.67</td>
<td>0.25 - 1.09</td>
</tr>
<tr>
<td>Day 180</td>
<td>0.77</td>
<td>0.39 - 1.15</td>
</tr>
<tr>
<td>Adult</td>
<td>1.08</td>
<td>0.52 - 1.64</td>
</tr>
</tbody>
</table>

Faecal Elastase

Laboratory: Referred from Biochemistry to City Hospital, Birmingham
Specimen: Minimum 5g stool
Turnaround: 2 Weeks
Ref. Range: See report form
Faeces – Molecular Analysis and Culture

Laboratory: Microbiology (Category 3 Laboratory)
Specimen: Faeces sample for molecular analysis of *Salmonella* spp., *Shigella* spp., *Campylobacter* spp. verotoxin (VT1 and / VT2; markers of enterohaemorrhagic disease), *Cryptosporidium parvum/hominis* and *Giardia lamblia*.

The specimen should be collected into a clean, sterile, leakproof container. Ideally, all specimens should be taken as soon as possible after onset of symptoms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. A number of important pathogens such as *Shigella* species may not survive the pH changes that occur in faeces specimens that are not promptly delivered to the laboratory, even if refrigerated.

Samples >72hrs old on receipt in the laboratory are unsuitable for testing. Hospital inpatient samples are not routinely retested for 14 days if they are continually in hospital for this period.

Comment: Rectal swabs are not suitable. Full clinical information should be provided, esp. presence and duration of symptoms, recent foreign travel or shellfish ingestion and previous antibiotics.

Clearance samples for *Salmonella*, *Shigella* and *Campylobacter* not routinely processed unless clinically indicated. Please discuss with Microbiology Medical team.

Turnaround:

Positive: samples received on Friday after 11:00am should be reported before 5 pm on the following Monday.

Clinically significant isolates are telephoned when available.

Report: Report presence of specific pathogen and absence of other pathogens (Target Not Detected or Target Detected). Faeces are cultured on selective media for *Salmonella* and *Shigella* when positive by molecular testing.

Verotoxigenic positive samples are sent to Cherry Orchard Reference laboratory for confirmation.

In addition, when clinically indicated, specific media for *Yersinia* spp. and *Vibrio cholerae* will be inoculated. Where appropriate i.e. HUS the specimen is sent to Cherry Orchard Hospital lab for detailed analysis of various enterohaemorrhagic *E. coli*

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

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

Fallopian Tube Aspirate / Tubo-ovarian Fluid

See Sterile Body Fluid – Microscopy and Culture.
Fanconi’s Anaemia

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

Farmers Lung Antibodies

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

Ferritin

Laboratory: Haematology
Specimen: Blood 4mL Red Vacuette® (clotted blood).
Comment: The level of serum ferritin correlates well with the body iron reserves under various physiological and pathological conditions. Ferritin is an acute phase reactant.
Test available Monday to Friday, during routine working hours.
Ferritin should be requested for investigation of abnormal FBC results and relevant clinical syndromes.
Use of haematinics for screening of well patients is not recommended.
Requests should be accompanied by clinical details.
See BCSH guidelines.
Laboratory Diagnosis of Functional Iron Deficiency
Turnaround: 7 working days
Ref. Range: Females 11 – 307 ng/ml, Males 17 – 320 ng/ml

Fertility Screen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Screen includes Hepatitis B Surface antigen, anti-HBcore, HIV Ag/Ab, anti-HCV
Turnaround: Negative samples: 36 hours. Please allow extra time for samples testing positive in house for HIV and anti-HCV (external confirmatory testing required).
Report: Positive or negative

Fibrinogen (Factor 1)

Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%).
Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling
Specimens must be received within 12 hours of phlebotomy.
Comment: Determines the concentration of plasma fibrinogen. Forms part of a Thrombophilia and/ or Lupus screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia. Test available Monday to Friday, during routine working hours, and for emergency reasons at all other times.
Turnaround: Emergency specimens: 2 hours by arrangement with the laboratory; Routine specimens: 8 hours, if part of Thrombophilia 3 – 4 weeks

<table>
<thead>
<tr>
<th>Ref. Range</th>
<th>Age</th>
<th>Mean (g/L)</th>
<th>Range g/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>2.9</td>
<td>1.7 – 4.0</td>
<td></td>
</tr>
<tr>
<td>Day 5</td>
<td>3.2</td>
<td>1.6 – 4.7</td>
<td></td>
</tr>
<tr>
<td>Day 30</td>
<td>2.7</td>
<td>1.6 – 3.8</td>
<td></td>
</tr>
<tr>
<td>Day 90</td>
<td>2.5</td>
<td>1.1 – 3.8</td>
<td></td>
</tr>
<tr>
<td>Day 180</td>
<td>2.6</td>
<td>1.2 – 3.9</td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>2.9</td>
<td>1.7 – 4.1</td>
<td></td>
</tr>
</tbody>
</table>

**Fibrinogen Phenotyping and Genetic Analysis**

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

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

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

Please note: 64 days

**Filaria Antibodies**

Laboratory: Microbiology (Infectious Diseases Serology)

Specimen: 4mL clotted blood

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

Turnaround: 3 weeks

Report: Positive or negative

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

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

Specimen: Adults: 2ml Lithium Heparin blood. 
Infants: 1ml min Lithium Heparin blood)

DO NOT refrigerate specimens.

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

Turnaround: See NCMG website

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

**Flow Cytometry**

Laboratory: Haematology

Specimen: Fresh Blood or Bone Marrow – 3mL, purple Vacuette (EDTA). Samples may be refrigerated overnight. Optimal sample age less than 24 hours.

Comment: Used as a diagnostic tool in identifying leukaemias. Test available Mon to Fri, during routine hours by arrangement with the Haematology laboratory. Please state specimen type on form, it is essential to provide relevant essential clinical information. Should be requested on the advice of a consultant haematologist.

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

Ref. Range: Not applicable
Foetal Genotype

Laboratory: Available by prior arrangement with Blood Transfusion Laboratory
Specimen: 16mL EDTA maternal
3mL EDTA paternal
Comment: If possible, 24 hours notice to Blood Transfusion Laboratory, CUH required
(Contact Ext 22537)
IBGRL Request Form F014 to be completed by requesting clinician (Available from Blood Transfusion Laboratory).
Samples referred to: IBGRL, Bristol, United Kingdom via IBTS.
NOTE: Foetal Sex Typing is NOT referred by the Blood Transfusion Laboratory, CUH.

Turnaround: 21 Working Days

Foetal DNA Rh D Screen

Laboratory: Blood Transfusion
Specimen: 1 x 6ml EDTA
Comment: This test available since 18/06/18. Performed by a reference laboratory (International Blood Grouping Reference Laboratory, Bristol, UK)
Minimum gestation 11 weeks + 2.

Turnaround: 3 weeks
Ref. Range: Rh D Positive; Rh D Negative; Rh D Inconclusive

Flecanide

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

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

Foetal Maternal Haemorrhage FMH by Flow Cytometry > 2.5mls bleed

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

Turnaround: 1-14 days for the hard copy report: It is practice of the referral laboratory to give a verbal report as soon as possible.

Foetal Sex Typing

Laboratory: Referred from Biochemistry to IBGRL, Bristol. Prior notice required to facilitate courier arrangements (Contact ext 22531)
Specimen: 16mL EDTA maternal
3mL EDTA paternal
Comment: Pregnancy must be at least 7 weeks
IBGRL request form (FM4739) to be completed by referring clinician

Turnaround: 5 working days from receipt of specimen in Bristol

Foetus – First Trimester

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

**Foetus – Post First Trimester**

See Autopsies/Post-Mortems under HISTOPATHOLOGY

**Folate (serum)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 4mL Red, Vacuette® (clotted blood).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Forms part of the investigation of Megaloblastic Anaemia. Please note that international studies have indicated that folic concentrations &lt; 4 ng/mL may be associated with deficiency. Therefore results &lt; 4 ng/mL should be subject to clinical as well as laboratory interpretation. Test available Monday to Friday, during routine working hours. B12 and Folate should be requested for investigation of abnormal FBC results and relevant clinical syndromes. Use of haematinics for screening of well patients is not recommended. Requests should be accompanied by clinical details. See BCSH guidelines. The diagnosis of B12 and folate deficiency <a href="http://onlinelibrary.wiley.com/doi/10.1111/bjh.12959/pdf">http://onlinelibrary.wiley.com/doi/10.1111/bjh.12959/pdf</a></td>
</tr>
<tr>
<td>Turnaround:</td>
<td>7 working days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>3.1 – 20 ng/mL</td>
</tr>
</tbody>
</table>

**Formalin fixed tissue**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Histopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Tissues for Histopathology excluding those listed below (See separate entries): Breast Needle Core Biopsy calcified and non-calcified Neck Dissection Specimens Renal Biopsy</td>
</tr>
<tr>
<td>Comment:</td>
<td>Specimens should be placed in a container, large enough to contain adequate Buffered Formalin for fixation (recommend ratio of at least 2:1 for Buffered Formalin Volume: specimen size). Ideally all specimens should be submitted intact to allow accurate gross examination. Tissue should not be removed from the specimen, for research purposes or otherwise, without prior consultation with a Pathologist as this may compromise accurate diagnosis. Where specimens are orientated by/with sutures etc, their designation should be clearly detailed on the accompanying Request Form.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Small biopsy - 80% of cases by day 5 Non-biopsy cancer resection - 80% of cases by day 7 Non-biopsy other - 80% of cases by day 7 Cancer specimens as per NCCP guidelines.</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
### Fragile X Syndrome (FRAX)

**Laboratory:** Referred from Molecular Genetics Lab in Biochemistry to NCMG.

**Specimen:**
- Infant: 1ml EDTA & 1ml Lithium Heparin bloods
- Adults: 3-5mls EDTA & 2mls Lithium Heparin bloods

**Comment:** Both blood types required as both DNA analysis and karyotype performed.

NCMG request form available from website, [www.genetics.ie](http://www.genetics.ie)

**Turnaround:** Up to 6 months

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

### Francisella tularensis Antibodies

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** 4mL clotted blood

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

**Turnaround:** 3 weeks

**Report:** Positive or negative

### Free T4 (Thyroxine)

**Laboratory:** Clinical Biochemistry

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

**Turnaround:** 4 Days

**Ref. Range:** 9.0 – 19.1 pmol/L

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

### Free T3 (Triiodothyronine)

**Laboratory:** Clinical Biochemistry

**Specimen:** 4.0 mL blood in plain tube

**Turnaround:** 4 Days

**Ref. Range:** 2.9 - 4.9 pmol/L

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

### Frozen Sections (Intraoperative Consultation), Neurosurgery

**Laboratory:** Neuropathology

**Specimen:** Fresh tissue (universal precautions)

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

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

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

An urgent on-call service is available outside of these hours on weekdays and
Turnaround: 20 minutes. Result is telephoned back to theatre.

**Frozen Sections – Urgent**

Laboratory: Histopathology (Diagnostic Laboratory)
Specimen: Fresh tissue
Comment: The Frozen Section service is available **Mon –Fri 8am to 4:30pm**

Outside of these hours if a frozen section is anticipated, the case must be discussed with a pathologist (after 5.30 the case must be discussed with the pathologist on-call who may be contacted through the hospital switchboard). *If the fresh specimen poses a health risk to laboratory personnel (e.g. TB, HIV), frozen analysis should not be undertaken.* Alternative approaches to rapid diagnosis may be discussed with Pathologist/Senior Medical Scientist.

Booking

Frozen sections Monday – Friday, should be booked in advance where possible (preferably 24hrs before elective surgery). The Histopathology laboratory should be contacted at ext. 22792 with the following details. Date and Time schedule / Patient name /Theatre /Surgeon / Specimen type.

**Note:** if the frozen section is delayed or cancelled please notify the Histopathology laboratory at ext. 22792.

Transportation

Unfixed tissue for frozen section must be transported directly to the laboratory immediately in a correctly labelled dry container, accompanied by a completed Request Form and handed to a Medical Scientist, NCHD or Consultant Histopathologist in the Histopathology laboratory. The form must have a red Frozen sticker attached. Specimens from external hospitals must be transported according to UN3373 standards (triple packaging).

Turnaround: 20 minutes per frozen section. If multiple frozen sections are received TAT will increase accordingly.

**FSH**

<table>
<thead>
<tr>
<th>Ref. Range</th>
<th>Laboratory: Clinical Biochemistry</th>
<th>Specimen: 4.0 mL blood in plain tube (clotted sample)</th>
<th>Turnaround: 4 Days</th>
<th>Post menopause: 26.7 – 133.4 IU/L Male: 1.0 – 12 IU/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follicular phase: 3.0 – 8.1 IU/L</td>
<td>Ovulation: 2.6 - 6.7 IU/L</td>
<td>Luteal phase: 1.4 – 5.5 IU/L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Laboratory: Haematology</th>
<th>Specimen: Blood 3mL purple Vacuette® (EDTA) Paediatric (1mL purple (EDTA) or 1.3 mL red) Note: 6ml purple EDTA Vacuette or any other sample type is unsuitable for FBC. Blood Films are made in the laboratory as required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment: Full Blood Counts: Impedence /Fluorescence Flow Cytometry Technology. Test available Monday to Friday, during routine working hours and for emergency reasons at all other times. FBC performed in the investigation of anaemias, infections, leukemias, platelet disorders and myeloproliferative disorders and also for the monitoring of therapies, e.g. nutritional, chemotherapy. Manual differentials, slide platelets and red cell morphology available</td>
<td></td>
</tr>
</tbody>
</table>
when deemed necessary or when the laboratory is contacted by clinician.

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

<table>
<thead>
<tr>
<th>Analyte &amp; units</th>
<th>Ambient Temperature</th>
<th>Refrigerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>36 hrs</td>
<td>56 hrs</td>
</tr>
<tr>
<td>RBC</td>
<td>48 hrs</td>
<td>72 hrs</td>
</tr>
<tr>
<td>HB</td>
<td>72 hrs</td>
<td>72 hrs</td>
</tr>
<tr>
<td>MCV</td>
<td>8 hrs</td>
<td>24 hrs</td>
</tr>
<tr>
<td>PLTS</td>
<td>48 hrs</td>
<td>48 hrs</td>
</tr>
</tbody>
</table>

Transport: Transport specimen to the laboratory at ambient temperature.

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

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

<table>
<thead>
<tr>
<th>Analyte &amp; units</th>
<th>Age &amp; Sex Related Reference Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin g/dl</td>
<td>0 minutes – 24 hours Male 14.9-23.7</td>
</tr>
<tr>
<td></td>
<td>1 day - 14 days Male 13.4 – 19.8</td>
</tr>
<tr>
<td></td>
<td>14 days - 2 months Male 9.4-13.0</td>
</tr>
<tr>
<td></td>
<td>2 months - 6 months Male 10.0-13.0</td>
</tr>
<tr>
<td></td>
<td>6 months – 12 months Male 10.1 – 13.0</td>
</tr>
<tr>
<td></td>
<td>12 months - 6 years Male 11.0 – 13.8</td>
</tr>
<tr>
<td></td>
<td>6 years – 12 years Male 11.1 – 14.7</td>
</tr>
<tr>
<td></td>
<td>12 years – 18 years Male 12.1 – 16.6</td>
</tr>
<tr>
<td></td>
<td>&gt;18 years Male 13.0 – 17.0</td>
</tr>
<tr>
<td></td>
<td>0 minutes – 24 hours Female 14.9 – 23.7</td>
</tr>
<tr>
<td></td>
<td>1 day - 14 days Female 13.4 – 19.8</td>
</tr>
<tr>
<td></td>
<td>14 days - 2 months Female 9.4 – 13.0</td>
</tr>
<tr>
<td></td>
<td>2 months - 6 months Female 10.0 – 13.0</td>
</tr>
<tr>
<td></td>
<td>6 months – 12 months Female 10.1 – 13.0</td>
</tr>
<tr>
<td></td>
<td>12 months - 6 years Female 11.0 – 13.8</td>
</tr>
<tr>
<td></td>
<td>6 years – 12 years Female 11.1 – 14.7</td>
</tr>
<tr>
<td></td>
<td>12 years – 18 years Female 12.1 – 15.1</td>
</tr>
<tr>
<td></td>
<td>&gt;18 years Female 11.7 – 15.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analyte &amp; units</th>
<th>Age &amp; Sex Related Reference Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red cell count x 10^{12}/l</td>
<td>0 minutes – 24 hours Male 3.7-6.5</td>
</tr>
<tr>
<td></td>
<td>1 day - 14 days Male 3.9-5.9</td>
</tr>
<tr>
<td></td>
<td>14 days - 2 months Male 3.1-4.3</td>
</tr>
<tr>
<td></td>
<td>2 months - 6 months Male 3.8 – 4.9</td>
</tr>
<tr>
<td></td>
<td>6 months – 12 months Male 3.9-5.1</td>
</tr>
<tr>
<td></td>
<td>12 months - 6 years Male 3.9 – 5.0</td>
</tr>
<tr>
<td></td>
<td>6 years – 12 years Male 3.9 – 5.2</td>
</tr>
<tr>
<td></td>
<td>12 years – 18 years Male 4.2 – 5.6</td>
</tr>
<tr>
<td></td>
<td>&gt;18 years Male 4.2 – 5.6</td>
</tr>
<tr>
<td></td>
<td>0 minutes – 24 hours Female 3.7-6.5</td>
</tr>
<tr>
<td></td>
<td>1 day - 14 days Female 3.9-5.9</td>
</tr>
<tr>
<td></td>
<td>14 days - 2 months Female 3.1-4.3</td>
</tr>
</tbody>
</table>
### Red cell count

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Female</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months - 6 months</td>
<td>3.8 – 4.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>3.9 - 5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>3.9 - 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years - 12 years</td>
<td>3.9 – 5.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>4.1 – 5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>3.9 – 5.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### White blood cell count x 10<sup>9</sup>/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>All</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>10.0 – 26.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>6.0 – 21.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>5.0 – 15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>6.0 – 17.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>6.0 – 16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>6.0 – 17.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>4.5 – 14.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>4.5 – 13.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>4.4 – 11.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Haematocrit l/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Male</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>0.47 – 0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>0.41 – 0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.28 – 0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>0.30 – 0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>0.30 – 0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>0.32 – 0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>0.32 – 0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>0.35 – 0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.38 – 0.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Female</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>0.47 – 0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>0.41 – 0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.28 – 0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>0.30 – 0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>0.30 – 0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>0.32 – 0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>0.32 – 0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>0.35 – 0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.35 – 0.46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mean Cell Haemoglobin pg

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Male</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>30.0 – 37.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>30.0 – 37.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>27.0 – 36.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>24.0 – 32.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>24.0 – 29.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>25.6 – 30.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>25.6 – 30.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>25.6 – 30.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>25.6 – 30.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Female</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>30.0 – 37.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>30.0 – 37.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>27.0 – 36.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>24.0 – 32.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>24.0 – 29.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>25.6 – 30.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>25.6 – 30.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>25.6 – 30.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>25.6 – 30.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mean Cell Haemoglobin Concentration g/dL
### MCHC

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>28.1 – 34.7</td>
<td>28.1 – 34.7</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>28.1 – 34.7</td>
<td>28.1 – 34.7</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>28.1 – 35.5</td>
<td>28.1 – 35.5</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>28.8 – 37.3</td>
<td>28.8 – 37.3</td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>32.1 – 37.4</td>
<td>32.1 – 37.4</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>32.9 – 35.6</td>
<td>32.9 – 35.6</td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>32.7 – 35.7</td>
<td>32.7 – 35.7</td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>33.5 – 35.2</td>
<td>33.0 – 35.5</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>31.0 – 37.0</td>
<td>31.0 – 37.0</td>
</tr>
</tbody>
</table>

### MCV

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>88 - 110</td>
<td>88 - 110</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>84 - 98</td>
<td>84 - 98</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>73 - 84</td>
<td>73 - 84</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>70 - 82</td>
<td>70 - 82</td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>72 - 87</td>
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</tr>
<tr>
<td>12 months - 6 years</td>
<td>76 - 90</td>
<td>76 - 90</td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>77 - 94</td>
<td>77 - 94</td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>80 - 96</td>
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</tr>
<tr>
<td>&gt;18 years</td>
<td>100-125</td>
<td>100-125</td>
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</tbody>
</table>

### Basophil count x 10^9/l

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>0.0 – 0.1</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>0.0 – 0.1</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.02 – 0.13</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>0.02 – 0.20</td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>0.02 – 0.13</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>0.02 – 0.12</td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>0.02 – 0.12</td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>0.02 – 0.12</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.0 – 0.1</td>
</tr>
</tbody>
</table>

### Eosinophil count x 10^9/l

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>0.0 – 0.85</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>0.0 – 0.85</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.05 – 0.9</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>0.1 – 1.1</td>
</tr>
<tr>
<td>6 months – 12 months</td>
<td>0.05 – 0.9</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>0.05 – 1.1</td>
</tr>
<tr>
<td>6 years – 12 years</td>
<td>0.05 – 1.0</td>
</tr>
<tr>
<td>12 years – 18 years</td>
<td>0.05 – 0.8</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.04 – 0.4</td>
</tr>
</tbody>
</table>

### Lymphocyte count x 10^9/l

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes – 24 hours</td>
<td>2.0 – 7.3</td>
</tr>
</tbody>
</table>
### Lymphocyte count

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day - 14 days</td>
<td>2.8 - 9.1</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>3.3 - 10.3</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>3.3 - 11.5</td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>3.4 - 10.5</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>1.8 - 8.4</td>
</tr>
<tr>
<td>6 years - 12 years</td>
<td>1.5 - 5.0</td>
</tr>
<tr>
<td>12 years - 18 years</td>
<td>1.5 - 4.5</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.9 - 3.2</td>
</tr>
</tbody>
</table>

### Monocyte count x 10⁹/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes - 24 hours</td>
<td>0.0 - 1.9</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>0.1 - 1.7</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.4 - 1.2</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>0.2 - 1.3</td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>0.2 - 0.9</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>0.15 - 1.3</td>
</tr>
<tr>
<td>6 years - 12 years</td>
<td>0.15 - 1.3</td>
</tr>
<tr>
<td>12 years - 18 years</td>
<td>0.15 - 1.3</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>0.15 - 1.3</td>
</tr>
</tbody>
</table>

### Neutrophil count x 10⁹/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes - 24 hours</td>
<td>2.7 - 14.4</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>1.5 - 5.4</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>0.7 - 4.8</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>1.0 - 6.0</td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>1.0 - 8.0</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>1.5 - 8.5</td>
</tr>
<tr>
<td>6 years - 12 years</td>
<td>1.5 - 8.0</td>
</tr>
<tr>
<td>12 years - 18 years</td>
<td>1.5 - 6.0</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>1.4 - 6.6</td>
</tr>
</tbody>
</table>

### Platelet count x 10⁹/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes - 24 hours</td>
<td>150 - 450</td>
</tr>
<tr>
<td>1 day - 14 days</td>
<td>170 - 500</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>210 - 650</td>
</tr>
<tr>
<td>2 months - 6 months</td>
<td>210 - 560</td>
</tr>
<tr>
<td>6 months - 12 months</td>
<td>200 - 550</td>
</tr>
<tr>
<td>12 months - 6 years</td>
<td>210 - 490</td>
</tr>
<tr>
<td>6 years - 12 years</td>
<td>170 - 450</td>
</tr>
<tr>
<td>12 years - 18 years</td>
<td>180 - 430</td>
</tr>
<tr>
<td>&gt;18 years</td>
<td>140 - 440</td>
</tr>
</tbody>
</table>

### Reticulocyte count x 10⁹/l

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes - 24 hours</td>
<td>110 - 450</td>
</tr>
<tr>
<td>1 day - 7 days</td>
<td>10 - 80</td>
</tr>
<tr>
<td>7 days - 1 month</td>
<td>10 - 65</td>
</tr>
<tr>
<td>1 month - 2 months</td>
<td>35 - 200</td>
</tr>
<tr>
<td>2 months - 5 months</td>
<td>15 - 110</td>
</tr>
<tr>
<td>5 months - 12 months</td>
<td>30 - 130</td>
</tr>
<tr>
<td>&gt;12 months</td>
<td>50 - 100</td>
</tr>
</tbody>
</table>

### Erythrocyte Sedimentation Rate mm/hour

<table>
<thead>
<tr>
<th>Gender</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Female</td>
<td>0 - 20</td>
</tr>
</tbody>
</table>

---

**Fungal Microscopy and Culture**

See Mycology

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This document is designed for online viewing. Printed copies, although permitted, are deemed Uncontrolled from 23:59 hours on 28/09/18
<table>
<thead>
<tr>
<th><strong>GATA Mutational analysis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Referred from Haematology to Weatherall MRC Molecular Haematology Unit</td>
</tr>
<tr>
<td>Specimen: 3 mL EDTA</td>
</tr>
<tr>
<td>Comment: By arrangement only with laboratory</td>
</tr>
<tr>
<td>Turnaround: 64 days</td>
</tr>
<tr>
<td>Ref. Range: Not Applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>G6PD Assay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Haematology</td>
</tr>
<tr>
<td>Specimen: Blood 3mL purple Vacuette® (EDTA)</td>
</tr>
<tr>
<td>Comment: Used in the investigation of Hereditary Haemolytic Anaemias. It is recommended that assays not be performed after severe haemolytic crisis, since G6PD levels may be falsely elevated. Test available Monday to Friday, during routine working hours. Unsuitable for analysis if Reticulocyte count is &gt;150 x 10^9/L</td>
</tr>
<tr>
<td>Turnaround: 14 days</td>
</tr>
<tr>
<td>Ref. Range: 4.6 – 13.5 U/g Hb. Note: Values for new-borns may range somewhat higher</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>G6PD Screen</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Haematology</td>
</tr>
<tr>
<td>Specimen: Blood 3mL purple Vacuette® (EDTA)</td>
</tr>
<tr>
<td>Comment: Used in the investigation of Hereditary Haemolytic Anaemias. Samples which have been determined deficient or intermediate by this qualitative method are assayed using a quantitative method. It is recommended that assays not be performed after severe haemolytic crisis, since G6PD levels may be falsely elevated. Test available Monday to Friday, during routine working hours. Unsuitable for analysis if Reticulocyte count is &gt;150 x 10^9/L</td>
</tr>
<tr>
<td>Turnaround: 1 week</td>
</tr>
<tr>
<td>Ref. Range: Normal/Decreased</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gamma-Glutamyltransferase (γ-GT)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Clinical Biochemistry</td>
</tr>
<tr>
<td>Specimen: 4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.</td>
</tr>
<tr>
<td>Ref. Range: 0-55  U/L (Males) 0-38 U/L (Females). Contact laboratory for Paediatric ranges.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ganglioside Antibodies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories.</td>
</tr>
<tr>
<td>Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)</td>
</tr>
<tr>
<td>Turnaround: Approx. 3 Weeks</td>
</tr>
<tr>
<td>Ref. Range: See report form, or visit internet site <a href="https://www.eurofins.ie/biomnis/">https://www.eurofins.ie/biomnis/</a> for up to date referral test information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gastric Parietal Cell Ab</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: Autoimmune Serology</td>
</tr>
<tr>
<td>Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)</td>
</tr>
<tr>
<td>Comment: Qualitative Immunofluorescence assay. Part of Autoantibody Screen.</td>
</tr>
<tr>
<td>Turnaround: 24 Hours</td>
</tr>
<tr>
<td>Ref. Range: Not applicable</td>
</tr>
</tbody>
</table>
**Gastrointestinal stromal tumours (GIST) - C-Kit Mutation Analysis, PDGFR Mutation Analysis**

| Laboratory: | Specimen referred from Histopathology to Dept. of Pathology, Ninewells Hospital |
| Specimen: | Histopathology Tissue block |
| Turnaround: | 4 weeks |

**GBM (Glomerular Basement Membrane Antibodies)**

| Laboratory: | Autoimmune Serology |
| Specimen: | Blood, 4 mL red top Vacuette (or similar container for clotted blood) |
| Comment: | Quantitative Immunoassay using Phadia Unicap 250 analyser. Restricted to CUH patients. |
| Turnaround: | 72 Hours |
| Ref. Range: | 0 - 10 AU/mL |

**GBMQ (GBM Quick Test)**

| Laboratory: | Autoimmune Serology |
| Specimen: | Blood, 4 mL red top Vacuette (or similar container for clotted blood) |
| Comment: | Qualitative Quick Card Test (5 Minutes) |
| Turnaround: | On Request. |
| Ref. Range: | Not applicable |

**Genital Swab**

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

| Laboratory: | Microbiology (Main laboratory) |
| Specimen: | Specimens for culture and sensitivity testing should be taken in the following situations:
  - The patient is clearly symptomatic of gonoccal infection.
  - The patient has tested positive for *N. gonorrhoea* on the urine cobas assay but has not yet commenced treatment.
  - There is evidence of treatment failure.
  - The patient is a known contact, and immediate epidemiological treatment is to be given. |

Because genital specimens are often taken from sites harbouring large numbers of commensal (normal) flora, attention to specimen selection and collection methods is critical.

Specimens should be collected using a sterile swab and transported ASAP in charcoal containing transport media.

The viability of *N. gonorrhoeae* is lost over time.

If processing is delayed, storage at ambient temperature is preferred.

| Comment: | Test performed routinely Monday to Friday 9-5pm or by urgent request. |
| Turnaround: | Prelim: 24 hours; Final: 72 hours. |
| Report: | Culture report on any clinically significant isolate with the appropriate sensitivities. |

**Genitourinary - TFE3/TFEB immuno + Renal tumour Cytogenetics**

| Laboratory: | Specimen referred from Histopathology to Dept. of Pathology, Ninewells Hospital |
| Specimen: | Histopathology Tissue block |
| Turnaround: | 4 weeks |

**Gentamicin / Genticin**

Refer to Antibiotic Assays
Glucocorticoid Remedical Aldosteronism (GRA)

Laboratory: Referred from Molecular Genetics Lab in Biochemistry to Addenbrookes NHS (via NCMG)
Specimen: 3-5ml EDTA blood
Comment: Use NCMG request form, available at www.genetics.ie
Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.
Turnaround: 2 weeks
Report: Sent to referring clinician and copy filed in pathology

Glucose

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL Sodium fluoride EDTA
Comment: Grey-capped specimen tube
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
GP or OPD- Results posted within 4 days.
Ref. Range: WHO Guidelines. See report form

Glucose (Urinary)

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

Glutamic Acid Decarboxylase Antibodies

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

Group B Streptococcal PCR

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 1mL EDTA blood, CSF (0.5mL)
Comment: Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin.
Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.
Turnaround: Samples received by IMSRL before 11am, result between 4pm and 5pm the same day
Report: Detected or not detected

Growth hormone (GH)

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

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Sample referred from Clinical Biochemistry to SAS Laboratory, Charing Cross Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood, 10mL fasting in EDTA bottle sent to the laboratory on ice.</td>
</tr>
<tr>
<td>Comment</td>
<td>Consultant request only</td>
</tr>
<tr>
<td>Turnaround</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>See report form.</td>
</tr>
</tbody>
</table>

### Haemochromatosis

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Performed in the Molecular Genetics lab in Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>3.0 mL EDTA blood</td>
</tr>
<tr>
<td>Comment</td>
<td>Please see investigation guidelines and specific request form on CUH website, <a href="http://www.cuh.hse.ie">www.cuh.hse.ie</a></td>
</tr>
<tr>
<td>Turnaround</td>
<td>4-6 Weeks</td>
</tr>
<tr>
<td>Report</td>
<td>Sent to referring clinician. Restricted access to genetic reports on laboratory database. Contact Biochemistry ext 22531/22361 to discuss results.</td>
</tr>
</tbody>
</table>

### Haem-Oncology Molecular Genetics (Haematology)

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Specimen referred from Haematology to Cancer Molecular Diagnostics laboratory, St. James Hospital, Dublin 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood 3mL purple Vacuette® (EDTA).</td>
</tr>
<tr>
<td>Comment</td>
<td>Leukaemia: PML-RARa, MRD and Chimaerism, TCR (T cell receptor), gene rearrangements, should be requested on the advice of a consultant haematologist.</td>
</tr>
<tr>
<td>Turnaround</td>
<td>60 days</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>See referral laboratory report</td>
</tr>
</tbody>
</table>

### Haemoglobin HbA1c Glycosylated Haemoglobin

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood 3mL purple Vacuette® (EDTA) (for Haemoglobin A1C a separate sample to the FBC sample is required)</td>
</tr>
<tr>
<td>Comment</td>
<td>Paediatric EDTA containers available from the paediatric diabetic Dept CUH, NB Primary paediatric tubes must be clearly labelled. Test available Monday to Friday, during routine working hours. As blood glucose rises, the increase in non-enzymatic glycation of proteins is proportional to both the level of glucose and the life span of the proteins in the circulation or tissues, therefore the measurement of HB A1c reflects the effectiveness of treatment in diabetes mellitus. Due to elevated HbF levels this test is unsuitable for neonates and patients &lt; 6 months.</td>
</tr>
<tr>
<td>Turnaround</td>
<td>24 – 48 hours</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>20 - 42 m mol/mol (IFCC)</td>
</tr>
</tbody>
</table>

### Haemoglobin A₂ Electrophoresis

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen</td>
<td>Blood 3mL purple Vacuette® (EDTA)</td>
</tr>
<tr>
<td>Comment</td>
<td>Haemoglobin A₂ percentage is useful for the diagnosis of the beta thalassemias and related disorders.</td>
</tr>
<tr>
<td>Turnaround</td>
<td>1 - 2 weeks</td>
</tr>
<tr>
<td>Ref. Range</td>
<td>&gt;2yrs old 2 – 3.5% at birth 0.2 – 0.3%</td>
</tr>
</tbody>
</table>
### Haemoglobin F

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL purple Vacuette® (EDTA)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Determined using HPLC / Electrophoresis Technologies. Test available Monday to Friday, during routine working hours.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 - 2 weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>&lt; 2% in adults.</td>
</tr>
</tbody>
</table>

### Haemoglobins S, C, D and E Electrophoresis

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL purple Vacuette® (EDTA).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Determines the percentage of Hb S, C, D and E, that may be present in variant haemoglobins. Test available Monday to Friday, during routine working hours.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 - 2 weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Normal: &lt;1.0%</td>
</tr>
</tbody>
</table>

### Haemoglobin S Sickle Screen

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL purple Vacuette® (EDTA).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Test available Monday to Friday during routine working hours. The laboratory must be contacted for all emergencies and out of hour requests. Used in screening for sickle cell disease and sickle cell trait. In the neonatal period HB F will be present in large amounts and so may mask the presence of HB S, if necessary the test should be repeated when the infant &gt; 6 months.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Emergency specimens: 2 hours</td>
</tr>
<tr>
<td></td>
<td>Routine specimens: 24 hours</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Positive / Negative</td>
</tr>
</tbody>
</table>

### Haemoglobinopathies

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Haematology to the National Haemoglobin Reference Laboratory, Oxford Haemophilia Centre, Churchill Hospital, Oxford OX3 7LJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Example: HbE, Thalassaemias and high affinity haemoglobins EDTA sample: minimum 2 mL blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Due to elevated HbF levels Thalassaemia screening is unsuitable for neonates and patients &lt; 6 months</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>12 weeks (84 days) but may vary depending on complexity of analysis</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See report form or contact National Haemoglobin Reference Laboratory.</td>
</tr>
</tbody>
</table>

### Haemolysin Test

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Blood Transfusion Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>1 x 4 mL Clotted Sample (red cap with yellow ring)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Usually performed on mothers of new-born babies in the investigation of ABO incompatibilities. Complete the Blood Transfusion request form LF-C-BTR-XMATCH. This is not an accredited test.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 hours</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Positive or Negative</td>
</tr>
</tbody>
</table>

### Haemophilia MH Research

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Referred from Haematology consultant to Oxford University Hospitals NHS JR320 tel 01865-220336</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>3 ml EDTA, minimum x 2 EDTA, 6 – 20 mls</td>
</tr>
</tbody>
</table>

---

This document is designed for online viewing. Printed copies, although permitted, are deemed Uncontrolled from 23:59 hours on 28/09/18.
**Comment:** By arrangement only with Haematology

**Turnaround:** 1 – 2 months

**Ref. Range:** Not applicable

### Haemophilus influenzae B Antibodies (IgG)

**Laboratory:** Clinical Biochemistry  
**Specimen:** Blood 4mL red top Vacuette® (or similar container for clotted blood)  
**Comment:** Test performed by reference laboratory (HPA Laboratory, Manchester).  
**Turnaround:** 3 weeks  
**Report:** Positive or negative

### Haemophilus influenzae PCR

**Laboratory:** Microbiology (Infectious Diseases Serology)  
**Specimen:** 1mL EDTA blood, CSF (0.5mL)  
**Comment:** Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.  
**Turnaround:** Samples received by IMSRL before 11am, result between 4pm and 5pm the same day  
**Report:** Detected or not detected

### Hantavirus Antibodies

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

### Haptoglobin

**Laboratory:** Clinical Biochemistry  
**Specimen:** 4.0 mL blood in plain tube (clotted sample)  
**Turnaround:** 4 Days  
**Ref. Range:** 0.44-2.15 g/L

### BHCG

**Laboratory:** Clinical Biochemistry  
**Specimen:** 4.0 mL blood in plain tube (clotted sample)  
**Turnaround:** 1 Day  
**Ref. Range:** 0 – 5 IU/L

### Helicobacter pylori Antibodies

This test is not available at the CUH laboratories.

### Helicobacter pylori Culture and Sensitivity

**Laboratory:** Microbiology (Main laboratory)  
**Specimen:** Specimens will only be processed by prior arrangement with the laboratory. As media must be freshly prepared a minimum of 48 hours notice is required for preparation of media, reagents etc. Two gastric biopsy specimens, one from the antrum and one from the body of the stomach, are taken during endoscopy, for culture. The biopsies are immediately introduced into transport medium, supplied by the laboratory, and sent directly to the Microbiology laboratory where they are processed immediately. Preferably patients should have ceased antimicrobial therapy and PPI therapy two weeks prior to endoscopy.
Comment: Transport specimens directly to the laboratory. In cases where a delay in transport cannot be avoided (specimens being transported from outside hospitals), the specimens must be packed on ice. Note: H. pylori rapidly loses viability at room temperature and when exposed to air. Please include any appropriate clinical details, e.g. previous therapy failure, stating the antibiotics previously administered. Please state if the patient was on therapy when the biopsies were taken, as this will warrant further incubation time.

Turnaround: Turnaround: Prelim report: 7 days, Final report: 14 days in cases where patients were taking antimicrobial agents at the time the biopsies were obtained.

Report: Culture with the appropriate sensitivities

<table>
<thead>
<tr>
<th>Heparin Assay (Anti Xa)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laboratory:</strong> Haematology</td>
</tr>
<tr>
<td><strong>Specimen:</strong> Blood 3mL, blue Vacuette® (sodium citrate 3.2%)</td>
</tr>
<tr>
<td>Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling</td>
</tr>
<tr>
<td><strong>Comment:</strong> Used to monitor the effectiveness of low molecular weight heparin therapy. It is essential to state the details of the type of low molecular weight heparin (LMWH) on the request form. Test performed once weekly (presently Wednesdays). Specimen must be taken: 4 hours post administration.</td>
</tr>
<tr>
<td><strong>Turnaround:</strong> 1 week.</td>
</tr>
<tr>
<td><strong>Ref. Range:</strong> Refer to report</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heparin /PF4 Antibody Test (HIT; Heparin Induced Thrombocytopenia screening test)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laboratory:</strong> Haematology by prior arrangement with Haematology laboratory staff during routine hours only. Positive specimens are referred for ELISA testing to Haematology to National Coagulation Laboratory, St., James Hospital, Dublin 8</td>
</tr>
<tr>
<td><strong>Specimen:</strong> Two Blood 4mL red top Vacuette® (or similar container for clotted blood) (Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).</td>
</tr>
<tr>
<td><strong>Comment:</strong> Patients must be off all anticoagulants, and details of the anticoagulation history of the patient must be supplied. 4T Score MUST be supplied on all requests. HIT request form must be filled in. Available at <a href="http://www.stjames.ie/GPsHealthcareProfessionals/Referral/ReferralForms/HIT%20request%20form%20Version%202%2025th%20August%202015.pdf">http://www.stjames.ie/GPsHealthcareProfessionals/Referral/ReferralForms/HIT%20request%20form%20Version%202%2025th%20August%202015.pdf</a></td>
</tr>
<tr>
<td><strong>Turnaround:</strong> Screening Test: 4 hours ELISA Test (referral laboratory): 28 days</td>
</tr>
<tr>
<td><strong>Ref. Range:</strong> See report form or contact Haematology to St., James Hospital Dublin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hepatitis A IgM Antibody</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laboratory:</strong> Microbiology (Infectious Diseases Serology)</td>
</tr>
<tr>
<td><strong>Specimen:</strong> 4mL clotted blood</td>
</tr>
</tbody>
</table>

This document is designed for online viewing. Printed copies, although permitted, are deemed Uncontrolled from 23:59 hours on 28/09/18
Comment: A qualitative test for the detection of IgM antibody to Hepatitis A virus. It can be used as an aid in the diagnosis of acute or recent Hepatitis A infection. Hepatitis A IgM testing is only routinely performed on samples from children <14yrs or on samples from people recently returned from overseas. Otherwise request with a full patient history or in outbreak situations. Anti-HAV IgM reactivity should be correlated with patient history and other hepatitis markers for diagnosis of past or present infection.

Turnaround: 36 hours
Report: Positive or negative

**Hepatitis A IgG Antibody**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Test is used to determine the immune status to Hepatitis A and is often used to monitor the success of Hepatitis A vaccination. It is often performed prior to vaccination in certain risk groups, e.g., army personnel going on overseas duty.

Turnaround: 36 hours
Report: Positive or negative

**Hepatitis B Australia Antibody (Anti-HBs)**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: This test is used to check the immune status to hepatitis B and is often used to monitor the success of hepatitis B vaccination. Please indicate patient vaccination history on the request form. For an inoculation injury, ≥10mIU/mL is considered protective for that incident. For a completed course of vaccination ≥100mIU/mL is considered an adequate response and such patients do not require further boosting or testing. For further information, please discuss with the Microbiology medical team.

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

Source: National immunisation guidelines

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

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

**Hepatitis B Core Antibody (Anti-HBc)**

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
**Test will detect total antibody to Hepatitis B Core antigen, i.e., IgM and/or IgG. A positive result indicates present or past infection with the Hepatitis B virus. This test should be interpreted in conjunction with other Hepatitis B markers.**

**Turnaround:** 36 hours  
**Report:** Positive or negative

### Hepatitis B Surface Antigen

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>A positive result may indicate acute or chronic carriage of the Hepatitis B virus. Positive specimens are considered presumptive positive only and a repeat specimen is requested. Positive specimens are tested with a full Hepatitis B virus marker profile, which includes anti-HBc, HBeAg, anti-HBe and anti-HBsAg.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Routine: 36 hours. Urgent: within 2 hours of receipt.</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Hepatitis C Antibody

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Positive specimens are considered presumptive positive only and a repeat specimen is requested. All new positives are referred to National Virus Reference Laboratory (NVRL) in Dublin for confirmation.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Routine: 36 hours. Urgent: within 2 hours of receipt. Please allow more time for samples testing positive in house.</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Hepatitis C Antigen

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Test performed weekly. This test is restricted to dialysis patients. A repeat sample is requested for all new positives.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>8 days</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Hepatitis D Antibody (Total)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Hepatitis delta virus (HDV) is in fact a sub-viral particle that relies on hepatitis B virus (HBV) to cause infection in humans. Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>10 working days</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Hepatitis E IgG

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>10 working days</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

### Hepatitis E IgM

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
</tbody>
</table>
### Hepatitis Screen

See Hepatitis B Surface Antigen and Hepatitis C Antibody

#### Hereditary Fever Syndromes (FMF, TRAPS)

- **Laboratory:** Referred from Molecular Genetics Lab in Biochemistry to National Amyloidosis Centre at UCL
- **Specimen:** 3ml EDTA blood + 3ml Serum
- **Comment:** Special request form available from ext 22531
- **Turnaround:** 4-6 weeks
- **Report:** Sent to referring clinician and copy filed in pathology

#### Herpes Simplex Virus IgG

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

#### Herpes Simplex Virus 1/2 Molecular

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** Viral swab (Remel swabs unsuitable), CSF, nasopharyngeal aspirate, sputum, broncho-alveolar lavage
- **Comment:** Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
- **Turnaround:** 5 working days
- **Report:** Detected or not detected

#### 5-HIAA

- **Laboratory:** Sample referred from Clinical Biochemistry to Beaumont hospital.
- **Specimen:** 24-hour urine sample collected into a container, which has acid, added. 24 hr urine containers are available from stores; acid is added in the Biochemistry lab. Avoid following foods for 48h before collection: bananas, chocolate, tomatoes, grapefruit, walnuts, avocado, pineapple, plums, dried fruit, citrus fruit, tea and coffee
- **Turnaround:** 3 weeks
- **Ref. Range:** See report form.

#### High Density Lipoprotein (HDL)

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
- **Ref. Range:** Male: > 1.0 mmol/L Female: > 1.2 mmol/L
- **Target values apply to pts at low or moderate risk CVD**
High Vaginal Swab (HVS)

Laboratory: Microbiology (Main laboratory)
Specimen: It is important to avoid vulval contamination of the swab. The posterior fornx, including any obvious candidal plaques should be swabbed. Low vaginal swabs are discouraged because the presence of high numbers of commensal flora makes them difficult to interpret (see Low Vaginal Swab for investigation of vulvo-vaginitis in paediatric patients). Only swabs sent in suitable transport medium will be processed – swabs that are sent without transport medium may be dry and may not yield the targeted organisms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

Comment: Specimens are generally examined for the presence of Candida or Group B Streptococci. Specimens will be processed for Trichomonas vaginalis and Bacterial Vaginosis (BV) only if a slide is received. Please indicate on the request form if the specimen is post-operative /post delivery so that supplementary testing can be performed. Vaginal swabs are not recommended for gonococcal culture on adults; an endocervical specimen is more appropriate. A separate specimen of urine or specific swabs and transport medium should be collected for the detection of C. trachomatis.

Turnaround: Prelim: 24 hours; Final: 48-72 hours
Report: Microscopy (by request): WBCs, yeasts, trichomonads and clue cells if present. Excess pus cells suggest infection; motile trichomonads indicate trichomoniasis, yeasts and hyphae suggest Candidiasis; clue cells in the absence of normal flora is suggestive of anaerobic vaginosis.

Histopathology Specimens

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

Pathologists are available for discussion of Histopathology cases, both pre and post receipt within the laboratory.

Urgent Specimens: Where case is deemed urgent by the clinician, this must be clearly indicated on the Request Form. The Histopathology laboratory does not operate an out-of-hours service. However a consultant pathologist is on-call and may be contacted through the main hospital switchboard, Ph. 021-4922424/4922100

Histone Antibodies

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

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

### HLA B27 Typing

**Laboratory:** Blood Transfusion Laboratory  
**Specimen:** 1x 3 ml EDTA purple cap (FBC) tube  
**Comment:** Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH  
**Turnaround:** 3 weeks  
**Ref. Range:** Not applicable.

### HLA Typing Class I and Class II (pre-Bone Marrow Transplant)

**Laboratory:** Blood Transfusion Laboratory  
**Specimen:** 3 x 4 ml EDTA purple cap (FBC) tube. Arrange for samples to be delivered to laboratory between Monday to Thursday.  
**Comment:** HLA typing referred to: HLA Department, I.B.T.S., National Blood Centre, James's St., Dublin 8. Mon. to Thurs.  
**Turnaround:** 3 weeks  
**Ref. Range:** Not applicable.

### HLA Typing (Disease Association e.g. HLA DQ2, HLA DQ8)

**Laboratory:** Blood Transfusion Laboratory  
**Specimen:** 3 x 4 ml EDTA purple cap (FBC) tube. Arrange for samples to be delivered to laboratory between Monday to Thursday.  
**Comment:** HLA typing referred to: HLA Department, I.B.T.S., National Blood Centre, James's St., Dublin 8. Mon. to Thurs.  
**Turnaround:** 3 Weeks  
**Ref. Range:** Not Applicable

### HLA Typing (re: Solid Organ Transplant)

**Laboratory:** Blood Transfusion Laboratory  
**Specimen:** 10 ml Citrate (blue cap bottle). 7.5 ml EDTA (purple cap bottle), 10 ml clotted sample (red cap bottle).  
**Comment:** This test is carried out by Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.  
**Turnaround:** Contact Histocompatibility and Immunogenetics Laboratory, Beaumont Hospital, Dublin 9.  
**Ref. Range:** Not Applicable
# HLH Granule release assay (Haemophagocytic Lymphohistocytosis)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Referred from Haematology to Great Ormond Street Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>EDTA x 5mls</td>
</tr>
<tr>
<td>Comment:</td>
<td>By arrangement only with laboratory</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>7 days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

# Homocystine – Free and Total (Paediatric patients)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Clinical Biochemistry to The Children’s Hospital, Temple Street, Dublin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Lithium Heparin sample which must be separated within 10 minutes of collection. Time must be stated on bottle and on form</td>
</tr>
<tr>
<td>Comment:</td>
<td>Please advise the lab in advance</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 week</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See report or contact Biochemistry Laboratory, Temple Street Hospital</td>
</tr>
</tbody>
</table>

# HMMA (VMA)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Clinical Biochemistry to BEAUMONT Hospital Dublin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Spot urine sample. Sample must be brought to Biochemistry laboratory immediately to have acid added.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See report form or contact Biochemistry Laboratory BEAUMONT Hospital</td>
</tr>
</tbody>
</table>

# HPA (Human Platelet Antigen + Antibody Investigation for NAITP)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Blood Transfusion Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Baby: 1 mL EDTA</td>
</tr>
<tr>
<td>Comment:</td>
<td>Only by prior arrangement with Blood Transfusion Laboratory, CUH</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Refer to IBTS, National Blood Centre, James’s St., Dublin.</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Refer to IBTS, Dublin.</td>
</tr>
</tbody>
</table>

# HTLV-I / II Antibodies

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood</td>
</tr>
<tr>
<td>Report:</td>
<td>Positive or negative</td>
</tr>
</tbody>
</table>

# Human Herpes Virus 6 (HHV-6) Molecular

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4mL clotted blood, 4mL EDTA blood, CSF</td>
</tr>
<tr>
<td>Report:</td>
<td>Detected or not detected</td>
</tr>
</tbody>
</table>
### Human Herpes Virus 8 (HHV-8) Molecular
- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL EDTA blood
- **Comment:** Test performed by a reference laboratory (Virus Reference Department, London)
- **Turnaround:** 15 days
- **Report:** Detected or not detected

### Human Immunodeficiency Virus (HIV) Serology
- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood
- **Comment:** Detects HIV antigen and antibody to HIV1 and HIV2. Newly positive specimens are referred to the National Virus Reference Laboratory, University College Dublin, for confirmation. A repeat specimen is requested on all newly diagnosed positive patients.
- **Turnaround:** Negative samples: 36 hours
  - Samples positive in house: 2 weeks (confirmation required)
- **Report:** Positive or negative

### HVA
- **Laboratory:** Sample referred from Clinical Biochemistry to BEAUMONT Hospital Dublin
- **Specimen:** Spot urine sample. Sample must be brought to Biochemistry laboratory immediately to have acid added
- **Turnaround:** 2 weeks
- **Ref. Range:** See report form or contact Biochemistry Laboratory BEAUMONT Hospital

### Hydatid Cyst
See Echinococcus Antibodies

### Hydroxyprogesterone (Alpha 17-Hydroxyprogesterone)
- **Laboratory:** Sample referred from Clinical Biochemistry to Leeds General Infirmary
- **Specimen:** 2.0 mL blood in a plain tube (clotted sample)
- **Comment:** Consultant request only
- **Turnaround:** 3 weeks
- **Ref. Range:** See report form

### Hydroxyprogesterone (Alpha 17-Hydroxyprogesterone) Blood Spots
- **Laboratory:** Sample referred from Clinical Biochemistry to University Hospital of Wales.
- **Specimen:** Blood spots taken at 4 points through the day. See comment.
- **Comment:** Consultant request only
- **Turnaround:** 3 – 4 weeks
- **Ref. Range:** Contact laboratory

### IgD
- **Laboratory:** Sample referred to Sheffield Protein Reference Unit.
- **Specimen:** 4.0 mL blood in a plain tube (clotted sample)
- **Comment:** Consultant request only
- **Turnaround:** 4 weeks
- **Ref. Range:** See report form

### IgE Total and Specific
- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Turnaround:** Up to 14 Days
- **Ref. Range:** Contact CUH Biochemistry Laboratory
IgG Subclasses

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

Immunoglobulins / Electrophoresis

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood a plain tube (clotted sample)
Comment: Age related reference values are available from Laboratory on request
Turnaround: 5 Days
Ref. Range:
- IgA: 0.8 – 2.8 g/L (15 – 45 Yrs)
- IgG: 6.0 – 16.0 g/L
- IgM: 0.5 – 1.9 g/L (15 – 45 Yrs)
  0.5 – 2.0 g/L (>45 Yrs)
For paediatric references, please contact laboratory.

Infectious Mononucleosis Screening test

Laboratory: Haematology
Specimen: EDTA specimen
Comment: This test is only performed if results of the Full Blood Count and/or manual differential suggests Infectious Mononucleosis, clinicians are requested to send a confirmatory test to Clinical Microbiology for EBV status on all positive screens. Comment added to all Negative results: A negative Monospot screen does not preclude IM infection. Result must be interpreted in conjunction with clinical details.
Turnaround: Not applicable
Report: Positive or Negative

INR (International Normalised Ratio)

Laboratory: Haematology: See Prothrombin Time (PT)

In Situ Hybridisation for Her2:Chromosome 17 ratio

Laboratory: Histopathology
Specimen: Formalin Fixed Paraffin Embedded Tissue.
Comment: This test is performed on a subset of breast and gastric cancer cases and other cases as required.
Turnaround: 10 working days
Report: Report is expressed as a ratio of Her 2 gene copy number divided by Chromosome 17 copy number.

Intrinsic Factor Antibodies

Laboratory: Haematology
Specimen: Blood 4mL Red Vacuette® (clotted blood).
Comment: Test available Monday to Friday, during routine working hours. Tests for IF antibodies are carried out on patients with suspected megaloblastic anaemia and a depressed serum vitamin B₁₂ to aid in the diagnosis of pernicious anaemia.
Free B12 levels of >444 ng/L can give false positive results.
Turnaround: 7 working days
Results: Negative / Indeterminate / Positive
### Insulin

Laboratory: Clinical Biochemistry  
Specimen: 2 mL blood in a plain tube (clotted sample)  
Comment: Consultant request only  
Turnaround: 7 days  
Ref. Range: Insulin levels should be appropriate for the glucose level at the time the sample was taken. Glucose should always be measured at the same time as the insulin to facilitate interpretation of results.  
Comment: Haemolysed sample unsuitable. Urgents available on request

### Insulin Antibodies

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

### Insulin like Growth Factor 1

Laboratory: Clinical Biochemistry  
Specimen: 4.0 mL blood in a plain tube (clotted sample), fresh sample.  
Comment: Haemolysed samples should be interpreted with care. Samples should be transported to the laboratory as soon as possible and must be frozen within 24 hours  
Turnaround: 2 weeks  
Ref. Range: Age and gender based. See report.

### Intraocular Fluids / Corneal Scrapings

Laboratory: Microbiology (Main laboratory)  
Specimen: Specialist collection according to local protocols – An ophthalmic surgeon will collect corneal scrapings and intraocular fluids. Because of the small amounts of material involved, initial inoculation of culture media and preparation of slides may need to be done at the patient’s side.  
The laboratory, in conjunction with local ophthalmologists, has agreed the following protocol for the collection of specimens, inoculation of media, and transport to the laboratory:  

**Corneal scrapings:**  
Scrapings should be taken aseptically (e.g. sterile scalpel blade)  
Aseptically remove the cap of the nutrient broth.  
Carefully, dip the tip of the scalpel, which contains the scrapings, into the broth and agitate gently.  
Ensure that the scraping has been removed and discard the scalpel into a sharps bin.  
Close the lid on the nutrient broth, label as appropriate, and send to the laboratory immediately.  
If Acanthamoeba keratitis is considered, please supplement the above by an additional scraping taken in the same fashion but placed on PCR swab (obtained from Microbiology laboratory, refer to Acanthamoeba above). Send to the laboratory with the appropriately completed form – the laboratory must be notified in advance. The contact lens case and rinse fluids should also be sent to the laboratory.

**Intraocular fluids:**  
Intraocular fluids which have been taken aseptically should be injected directly into an equal volume of nutrient broth, labelled as appropriate and sent to the laboratory as soon as possible with an appropriately labelled form.  
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
**Intra-Uterine Contraceptive Device (IUCD)**

- **Laboratory:** Microbiology (Main laboratory)
- **Specimen:** IUCDs should only be sent if clinical suspicion of infection exists. Place the entire IUCD, including any exudate, in a clean, sterile, leakproof container and transport ASAP. Specimen should be delivered to the laboratory as soon as possible to protect the viability of fragile organisms such as *Neisseria* spp.
- **Comment:** Test performed Monday to Friday 9-5pm.
- **Turnaround:** Prelim: 24 hours; Final: 48 – 72 hours. Note: Culture for Actinomycosis takes up to 17 days.
- **Report:** Any clinically significant isolate with the appropriate sensitivities. Culture for Actinomyces spp. Proceeding which will be reported if positive.

**Intra-Uterine Infection Screen / TORCH Screen**

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood (Minimum volume for baby specimens: 1mL)
- **Comment:** TORCH Screen includes *Toxoplasma gondii* IgM, Rubella IgM, CMV IgM and Parvovirus B19 IgM.
- **Turnaround:** 36 hours.
- **Positive Toxoplasma IgM must be confirmed by reference laboratory – at least 3 weeks.**
- **Report:** Positive or negative

**Intravascular Cannulae – Culture**

See Catheter / Intravascular Cannulae

**Iron**

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Comment:** Marked haemolysis invalidates the result
- **Turnaround:** 4 Days
- **Ref. Range:** Male: 12.5-32.2 µmol/L  Female: 10.7-32.2 µmol/L

**JC Virus Molecular**

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood, 4mL EDTA blood, CSF, urine
- **Comment:** Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Serum/plasma must be frozen by laboratory within 24 hours of sample collection.
- **Turnaround:** 5 working days
- **Report:** Positive or negative

**JAK2 in MPD (and CALR)**

- **Laboratory:** Referred from Haematology Dept. to CMD in St James Hospital, Mon to Thurs to reach haematology lab by 12 noon,
- **Specimen:** Blood 3mL, purple, Vacuette® (EDTA) or Bone Marrow in 10mls in RPMI
- **Comment:** Mutation analysis in MPD
- **Turnaround:** **60 days**
- **Ref. Range:** See referral laboratory report

**JAK2 Exon 12 mutation**

- **Laboratory:** Referred from Haematology Dept. Addenbrookes Hospital Cambridge, Mon to Thurs to reach haematology lab by 12 noon, May also be sent to Oncology Cytogenetics, 5th Floor Tower Wing, Guy’s Hospital, Great Maze Pond, London SE1 9RT
Specimen: Blood 3mL, purple, Vacuette® (EDTA) or Bone Marrow in 10mL in RPMI

Comment:

Turnaround: 64 days
Ref. Range: See referral laboratory report

Joint Aspirate for Crystals

Laboratory: Histopathology (Cytology Department)
Specimen: Joint Fluid
Comment: Tests are performed routinely Monday to Friday during routine working hours
Turnaround: Can be immediate if urgently requested by prior communication, routine 1-2 days
Ref. Range: Not applicable

Joint Fluid - Microbiology

See Sterile Body Fluid – Microscopy and Culture.

Karyotyping (see Chromosome analysis)

Kleihauer Test for Foetal Cells FMH

Laboratory: Haematology, and bleeds of >2.5mLs in postnatal patients are referred to Rotunda Hospital for flow Cytometry
Specimen: Blood 3mL purple Vacuette® (EDTA)
Comment: Test available Monday to Friday, during routine working hours, and for emergency reasons at all other times.
   It is a procedure that identifies individual cells containing HB F. It has proved useful in determining the extent of foetal bleed into the maternal circulation, and can be used to calculate the dose of Anti-D to be administered to the patient. Kleihauer test is only validated for the administration of Anti-D to Rh Neg mothers. Kleihauer test is not performed on Rhesus Positive women except in cases of Women who have had a late intrauterine foetal death (IUFD) after 18 completed weeks of pregnancy.
   >2.5mLs in postnatal patients are referred to Rotunda Hospital for flow Cytometry
   >12mL bleeds are phoned to requesting ward
Turnaround: Emergency specimens: <2 hours
   Routine specimens: 24 – 72 hours.
Ref. Range: To calculate dosage of Anti-D required refer to CUMH Anti-D dosage Policy.

Lacrimal (Tear Duct) Fluid

Laboratory: Microbiology (Main laboratory)
Specimen: Stones / secretions should be collected into a clean, sterile, leakproof container and immediately transported to the laboratory.
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround: Prelim: 24 hours; Final: 48-72 hours
Report: Culture report: Any clinically significant isolate with the appropriate sensitivities.

Lactate

Laboratory: Clinical Biochemistry
Specimen: Blood in Fluoride Oxalate tube, on ice
Turnaround: 2 hours
Ref. Range: 0.5 – 2.0 mmol/L

Lactate dehydrogenase (LDH)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Haemolysis invalidates result
<table>
<thead>
<tr>
<th>Test</th>
<th>Laboratory</th>
<th>Specimen</th>
<th>Comment</th>
<th>Turnaround</th>
<th>Ref. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>La (SS-B)</strong></td>
<td>Autoimmune Serology</td>
<td>Blood, 4 mL red top Vacuette</td>
<td>Qualitative Elisa assay. Automatically undertaken on all Anti-ENA positive sera.</td>
<td>72 Hours</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Lead</strong></td>
<td>Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories</td>
<td>4.0 mL blood in Li Hep – whole blood</td>
<td>See report form, or visit internet site <a href="https://www.eurofins.ie/biomnis/">https://www.eurofins.ie/biomnis/</a> for up to date referral test information.</td>
<td>3 weeks</td>
<td></td>
</tr>
<tr>
<td><strong>Leishmania Antibodies</strong></td>
<td>Microbiology (Infectious Diseases Serology)</td>
<td>4mL clotted blood</td>
<td>Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London)</td>
<td>3 weeks</td>
<td>Positive or negative</td>
</tr>
<tr>
<td><strong>Leptospira IgM</strong></td>
<td>Microbiology (Infectious Diseases Serology)</td>
<td>4mL clotted blood</td>
<td>EIA for Leptospira IgM. Test performed once per week. Positive sera are sent to Rare &amp; Imported Pathogens Laboratory (RIPL) in Porton Down for confirmation.</td>
<td>Negative samples: 8 days</td>
<td>Negative or positive</td>
</tr>
<tr>
<td><strong>Leucocyte (White Cell) Antibody Investigation</strong></td>
<td>Blood Transfusion Laboratory</td>
<td>1 x 4 mL Capped/Yellow Ring Tube</td>
<td>Samples referred to: I.B.T.S., National Blood Centre, James’s St., Dublin 8. Complete the Blood Transfusion request form LF-C-BTR-XMATCH or LF-C-BTR-ANTENAT. This is not an INAB accredited test.</td>
<td>3 Weeks</td>
<td>Not Applicable</td>
</tr>
<tr>
<td><strong>LH</strong></td>
<td>Clinical Biochemistry</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
<td>Follicular phase: 1.8 – 11.8 IU/L Post menopause: 5.2 - 62 IU/L</td>
<td>4 Days</td>
<td>1.8 - 11.8 IU/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Midcycle: 7.6 – 89.1 IU/L Post menopause: 5.2 - 62 IU/L</td>
<td></td>
<td>7.6 - 89.1 IU/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Luteal phase: 0.6 – 14.1 IU/L Post menopause: 5.2 - 62 IU/L</td>
<td></td>
<td>0.6 - 14.1 IU/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male: 0.6 – 12 IU/L</td>
</tr>
</tbody>
</table>
**Lithium**

Laboratory: Clinical Biochemistry  
Specimen: 4.0 mL blood in a plain tube (clotted sample)  
Comment: Sample 12 hours post dose (trough sample)  
Turnaround: 1 Day  
Ref. Range: 0.5 – 0.8 mmol/L. Recommended range for maintenance therapy. Acute therapy may require levels up to 1.2 mmol/L

**Liver Biopsy for Copper /Iron Estimation**

Laboratory: Sample referred from Histopathology Laboratory to Trace Element Unit, Kings Healthcare Trust, London  
Specimen: Liver Biopsy unfixed  
Comment: Biopsy: Transfer from the needle without delay. At least 1 cm is required (or results may be invalid due to liver non-homogeneity). Clearly label a universal container with Patients name, date of birth, specimen type and date sample is taken. Place the biopsy between two pieces of 2.5cm filter paper moistened with distilled water (larger pieces do not need to be on filter paper). If the specimen is to be divided eg for histology, use a new scalpel blade and divide the sample in two. The second piece for histology is placed in a second clearly labelled container in neutral buffered formalin. Transport the specimen(s) to the Histology laboratory.  
Turnaround: 4-6 weeks

**LKM (Liver/Kidney Microsome Antibodies)**

Laboratory: Autoimmune Serology  
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)  
Comment: Reported if seen on Autoantibody Screen.  
Turnaround: 24 Hours  
Ref. Range: Not applicable

**Low Density lipoprotein (LDL)**

Laboratory: Clinical Biochemistry  
Specimen: 4.0 mL blood in plain tube (clotted sample)  
Comment: Calculation. Results not reported if Triglyceride > 4.5 mmol/L  
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.  
Ref. Range: <3.0 mmol/L

**Low Vaginal Swab**

Laboratory: Microbiology (Main laboratory)  
Specimen: Investigation of vulvo-vaginitis in paediatric patients. Only swabs sent in suitable transport medium will be processed – swabs that are sent without transport medium may be dry and may not yield the targeted organisms. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.  
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.  
Turnaround: Prelim: 24 hours; Final: 48-72 hours  
Ref. Range: Culture: Any clinically significant isolate with the appropriate sensitivities
**Lupus Anticoagulant Screen**

**Laboratory:** Haematology  
**Specimen:** Blood 3mL x 2, blue Vacuette® (sodium citrate 3.2%) and 1x 4mL red top Vacuette (clotted).  
(Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).  
**Samples must be received within 4 hours.**  
**Note:** BCSH guidelines on thrombophilia testing must be adhered to.  
**Comment:** Test available Monday to Friday, during routine working hours. Lupus anticoagulants are immunoglobulins that interfere with phospholipid-dependent coagulation tests. The screen comprises the following tests: PT, APTT, Fibrinogen assay, AFSL, and DVVT. Anti-Cardiolipin antibodies are also included as part of the screen if a clotted sample is received.  
**Samples without Clinical details WILL NOT be processed.**  
**Turnaround:** 3 – 4 weeks (Refer to the main Haematology Section on Coagulation).  
**Ref. Range:** Strongly Positive, Moderately Positive, Weakly Positive or Negative

**Lyme Serology / Borrelia burgdorferi Antibodies**

**Laboratory:** Microbiology (Infectious Diseases Serology)  
**Specimen:** 4mL clotted blood, CSF (1mL)  
**Comment:** **CSF only tested where antibody confirmed in blood.**  
If clinically suspicious the test should be repeated after a month as antibodies take some time to develop.  
Serum samples testing positive in house and CSF specimens are sent to a reference laboratory (Rare and Imported Pathogens Laboratory (RIPL), Porton Down).  
**Turnaround:** Negative serum samples: 36 hours  
Serum samples positive in house and CSF: 3 weeks  
**Report:** Positive or negative

**Lymphogranuloma venereum LGV**

**Laboratory:** Microbiology  
**Specimen:** Male Rectal swab. Appropriate PCR STD Specimen Collection and Transport Kits must be used. Please read the kit insert for information on specimen collection and associated limitations.  
**Comment:** Performed by a reference laboratory (Molecular Microbiology, Central Pathology Laboratory, St James Hospital. Dublin 8).  
This test is only performed on male rectal specimens that have tested positive for Chlamydia tracomatis and where the patient has the following clinical details:  
- HIV positive  
- A contact of a known LGV confirmed case  
- Symptomatic of LGV  
**Turnaround:** 7 working days  
**Report:** Detected or not detected

**M2 (Pyruvate Dehydrogenase Elisa Test)**

**Laboratory:** Autoimmune Serology  
**Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)  
**Comment:** Quantitative Elisa. Undertaken automatically on all sera showing specific Anti-Mitochondrial Immunofluorescence on Autoantibody Screen.  
**Turnaround:** 96 Hours  
**Ref. Range:** 0 - 5 IU/ML
### Magnesium (Blood)

**Laboratory:** Clinical Biochemistry  
**Specimen:** 4.0 mL blood in plain tube (clot sample)  
**Comment:** Haemolysis invalidates result  
**Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.  
**Ref. Range:** 0.7 – 1.0 mmol/L

### Magnesium (Urinary)

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

### Malaria Antigen and Blood Film Screen

**Laboratory:** Haematology  
**Specimen:** Blood 3mL purple Vacuette® (EDTA) <12 Hours old  
**Comment:** Test available Monday to Friday during routine working hours, and for emergency reasons at all other times. Please notify laboratory when sending request. An immunodiagnostic test is used for the detection of circulating *Plasmodium falciparum* antigens and an antigen that is common to four species of malaria, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *plasmodium malariae* in whole blood. Blood films are examined to confirm presence of same, to identify other forms of Malaria. *P. malariae*, *P. ovale*, *P. falciparum*. *P. vivax* and *P. knowlesi*, also to estimate the percentage of infestation of *Plasmodium falciparum* or *P. knowlesi* if present. Low parasite density may produce a negative result on the antigen screening method. This screening test is not intended for use in screening asymptomatic populations. Blood films are examined to confirm presence of malaria, to identify the form of Malaria present and also to estimate the percentage infestation. Positive samples are referred from Haematology PHE Malaria Reference Laboratory, Faculty of Infectious & Tropical Diseases, London School of Hygiene & Tropical Medicine, Keppel Street, LONDON, WC1E 7HT. Please supply history of travel, prophylaxis, previous infections, etc.  
**Turnaround:** A verbal report is always given on day of sample receipt.  
**Emergency specimens:** 4 hours  
**Routine specimens:** 2 days  
**Positive samples referred as outlined above:** 28 days (phoned report available within 3 working days)  
**Ref. Range:** Negative / Positive (with % Parasitaemia if *P. falciparum* or *P. knowlesi*).

### Maturity Onset Diabetes of the Young (MODY)

**Laboratory:** Referred from Molecular Genetics Lab in Biochemistry to Royal Devon & Exeter NHS(via NCMG)  
**Specimen:** 3-5ml EDTA blood  
**Comment:** Special request form available from [http://www.diabetesgenes.org/sites/default/files/mody_request_form_april_2013_0.doc](http://www.diabetesgenes.org/sites/default/files/mody_request_form_april_2013_0.doc)  
**Please note:** invoices will be issued directly to the referring clinician.  
**Turnaround:** 8 weeks  
**Report:** Sent to referring clinician and copy filed in pathology
### Measles IgG Antibody
- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood
- **Turnaround:** 36 hours
- **Report:** Positive or negative

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

### Measles Molecular
- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood, oral fluid, CSF
- **Comment:** Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Serum must be frozen by laboratory within 24 hours of sample collection.
- **Turnaround:** 7 working days
- **Report:** Detected or not detected

### Meningitis C Vaccine Antibodies
- **Laboratory:** Clinical Biochemistry
- **Specimen:** Blood 4mL red top Vacuette® (or similar container for clotted blood)
- **Comment:** Performed by a reference laboratory (Irish Meningococcal and Meningitis Reference Laboratory, The Children’s Hospital, Temple Street, Dublin).
- **Turnaround:** 8-10 weeks
- **Report:** Positive or negative

### Meningococcal PCR
- **See Neisseria meningitidis PCR**

### Metabolic Screen / Blood (Amino Acid Chromatography)
- **Laboratory:** Sample referred from Clinical Biochemistry to The Children’s Hospital, Temple Street, Dublin
- **Specimen:** Lithium Heparin sample which must be separated immediately
- **Turnaround:** 1 week
- **Ref. Range:** See report or contact Biochemistry Laboratory Temple Street Hospital.

### Metabolic Screen / Urine
- **Laboratory:** Sample referred from Clinical Biochemistry to The Children’s Hospital, Temple Street, Dublin
- **Specimen:** Spot urine, transport to Bio lab immediately for the addition of 5% Merthiolate
- **Comment:** Sample assayed for Creatinine, Protein, Ph, reducing substances, blood, glucose, ketones, mucopolysaccharides, sulphur amino acids, amino acid chromatography, ketoacids (DNPH)
- **Turnaround:** 1 week
- **Ref. Range:** See report or contact Biochemistry Laboratory, Temple Street Hospital.

### Metanephrines (plasma)
- **Laboratory:** Sample referred from Clinical Biochemistry to Biochemistry Department, Freeman Hospital, Newcastle
- **Specimen:** 2 EDTA blood samples (5-7 mLs) taken 10 minutes apart. Send to laboratory on ice.
- **Comment:** Consultant request only
Metanephrines (Urinary)

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

Methadone

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

Methaemoglobin

Laboratory: Clinical Biochemistry
Specimen: Lithium Heparin syringe
Turnaround: 1 hour 15 mins
Ref. Range: < 1.5%

Methicillin-Resistant Staph aureus (MRSA)

Laboratory: Microbiology (Main laboratory)
Specimen: Swabs should be placed in charcoal containing transport media. Use a clean, sterile, leakproof container for CSU and sputum. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment: Test performed Monday to Friday (cut-off is 1pm).
Label all Microbiology forms with MRSA SCREEN. Indicate if the patient was previously MRSA positive. In screening investigations, patient surveillance cultures usually include one swab from both nares, one swab from both axillae and one swab from both sides of groin (3 swabs in all). Swabs from nares, axillae and umbilicus are sufficient for infants and neonates. The anterior nares are the usual site cultured from hospital staff. Occasionally a more extensive screening of staff who are carriers is required e.g. during an outbreak. When MRSA is detected in any microbiological specimen, on completion of treatment rescreen as recommended by national and local guidelines.
For electronic orders through the iCM system, one request should be entered for nares, one for axilla and groin (one number, print two labels), and one for any other site that is to be tested.
Turnaround: Prelim: 24 hours; Final: 24-48 hours
Report: MRSA not isolated or MRSA isolated. Appropriate sensitivities on new isolates.

Methotrexate (High Dose)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (Gel free clotted sample)
Comment: Measured in CUH only on patients with high-dose Methotrexate. Contact Biochemistry laboratory in advance – it is desirable to check the 48hr post dose level on Wednesdays.
Turnaround: Same day
Ref. Range: Post high dose Methotrexate levels are measured at 48hr, 72hr and every 24hrs until level is <0.05 μmol/L to guide Calcium Folinate (Leucovorin) rescue therapy.

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

Microdeletion Syndromes (see FISH)

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

Mineral Analysis (copper/iron)
Laboratory: Histopathology
Specimen: Liver biopsy unfixed
Comment: Place specimen on filter paper in dry universal container
Turnaround: 4-6 weeks (specimen is referred to external laboratory)

Mitochondrial Antibodies (Immunofluorescence Test)
Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Immunofluorescence assay. Part of Autoantibody Screen. Quantitative Anti-M2 assay automatically undertaken on all immunofluorescence positive sera.
Turnaround: 24 Hours
Ref. Range: Contact Laboratory

Mitochondrial Genetics
Laboratory: Referred from Molecular Genetics lab in Biochemistry to Newcastle Mitochondrial NCG via NCMG
Specimen: 3-5ml EDTA blood
Please note: invoices will be issued directly to the referring clinician.
Turnaround: 8-10 weeks
Report: Sent to referring clinician and copy filed in pathology

Mouth Swab
Laboratory: Microbiology (Main laboratory)
Specimen: Specimen pus if present otherwise swab any lesions or inflamed areas. A tongue depressor or spatula may be helpful to aid vision and avoid contamination from other parts of the mouth. Swabs should be transported as soon as possible in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature.
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request. For possible herpes infection consider a Viral Culture. A separate swab in appropriate viral transport media is necessary.
Turnaround: Microscopy for Vincent’s angina: 24 hours
           Culture Final: 24-48 hours
Report: Presence or absence of Vincent’s organisms.
Culture: Any clinically significant isolate with the appropriate sensitivities.

**MSU – Midstream Urine**
See Urine Microscopy and Culture or Cytology

**MTHFR (Methylenetetrahydrofolate Reductase) C667T Mutation**
Laboratory: Sample referred from Haematology to Eurofins-Biomnis
Specimen: 3.0 mL blood EDTA
Comment: When the body is deficient in methylenetertahydrofolate reductase its ability to absorb folate is inhibited. Folic acid is essential for red cell production and for the development and health of the foetus and deficiency may lead to hyperhomocystinemia and preeclampsia.

A combined request/consent form as part of the new EU GDPR rules is required to be completed and is available on the Eurofins website

Turnaround: 32 days
Ref. Range: See referral laboratory report form

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

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

**Mumps Molecular**
Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: Oral fluid, throat swab, CSF, urine
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround: 7 working days
Report: Positive or negative

**Muscle Biopsy**
Laboratory: Neuropathology
Specimen: Fresh Muscle (universal precautions)
Comment: The muscle biopsy must be at least 1.5cm x 1.5cm x 1.5cm in size. For certain suspected metabolic or mitochondrial disorders, a larger sample may be required for molecular or biochemical analysis. Please contact the Neuropathologist to discuss the case in advance.

The biopsy should be sent immediately FRESH to the Neuropathology Department. Universal safety precautions for fresh tissue should apply. For specimens which have to be sent over a distance (e.g. Mercy, Bantry, Mallow, Limerick etc.) the biopsy can be wrapped in clingfilm to avoid drying out during transport. Telephone 021 4922519 to let us know that the biopsy is en route. The biopsy should be delivered directly to a staff member in the Neuropathology Dept. Please pack sample according to Packing Instruction 650. Taxi driver/courier should be instructed not to leave specimen at laboratory reception and also instructed in how to deal with spillages. The muscle biopsy should reach the department by 4.00pm. On receipt of the specimen a staff member will telephone the referring hospital laboratory to
confirm that the tissue has arrived safely.
Muscle histochemistry is performed in batches once weekly, on Wednesdays.
The biopsy can be taken on any day and sent to arrive in the Neuropathology
Department no later than 4.00pm.
Additional information is available in the protocol for muscle biopsy (available
from the Neuropathology Dept.).

**Muscle Mitochondrial Enzyme and Genetic Analysis**

| Laboratory:  | Neuropathology |
| Specimen:    | Frozen Muscle  |
| Comment:     | Please refer to muscle biopsy protocol above. Specimens sent to Newcastle Mitochondrial NCG Diagnostic Service, Newcastle Upon Tyne, UK. |
| Turnaround:  | 4-12 weeks but may be up to 6 months depending on case complexity. |

**Mutation analysis for inherited bleeding disorders, Haemophilia carrier testing for direct mutational detection, mutation analysis for inherited Factor VIII or Factor IX deficiency**

| Laboratory:  | Referred from Haematology Dept. to Haemostasis Molecular Diagnostics (HMD), National Coagulation Laboratory, Centre for Clinical and Laboratory Medicine, CPLM, St James Hospital, Dublin 8 |
| Specimen:    | Min x 2 EDTA, 6-20 ml |
| Comment:     | Contact Coagulation Medical Team at 01 4162141 Counselling and consent required before testing Samples must be received in the laboratory within 7 days of phlebotomy |
| Turnaround:  | **95 days** but can vary depending on gene |
| Ref. Range:  | N/A |
# Mycobacteria Testing

**Laboratory:** Microbiology (TB Laboratory)

## Specimen Types

- **Sputum** – Collect early in the morning on at least 3 consecutive days. Sputum should be expectorated from the lower respiratory tract by deep coughing. Preferably, collect a minimum volume of 5mL per specimen. Saliva and postnasal secretions are not suitable. Specimens collected on 3 consecutive days should not be pooled. This may be important if Mycobacteria other than *Mycobacterium tuberculosis* are isolated as interpretation is based on repeated isolation.

- **Bronchial washings** – Minimum specimen size is preferably 5mL.

- **Urine** – Only processed after prior consultation with Microbiology Medical Team. Collect early morning urine on 3 consecutive days. A minimum volume of 20mL is desirable.

- **Gastric lavage fluid** – Only processed after prior consultation with Microbiology Medical Team. Collect samples only on Monday to Friday. Collect early in the morning (before breakfast) on 3 consecutive days. Preferably, collect a minimum volume of 5mL per specimen. If the samples are not delivered promptly to Microbiology, gastric acid present in sample will render them useless for processing. Deliver samples straight to the Microbiology laboratory by 9.00am. Gastric lavage samples must be accompanied by a Handwritten Green Microbiology request form. Gastric lavage samples should not be ordered through iCM.

- **Blood Culture for Mycobacterial investigation** – Only processed after prior consultation with Microbiology Medical Team. Please contact the TB laboratory first as specific bottles for TB culture are available from the laboratory on request (ext. 22823), (Mallow General Hospital, Bantry General Hospital and Mercy University Hospital laboratories must contact the Microbiology medical team on ext 22500/20120 to request bottles for sampling). Blood is added directly to the culture bottles (1-5mL of blood or marrow). The culture bottles should be transported immediately to the laboratory; Samples processed Monday to Friday 9-5.

- **Bone marrow** is added directly to the culture bottles; see procedure for blood above.

- **CSF, body fluids, aspirates, pus** – Collect aseptically as much as possible into a sterile container. Preferably, a volume of 5-10mL of CSF is required.

- **Skin / tissue biopsy / post-mortem specimens** – Collect aseptically into a sterile container without preservative. Select a caseous portion if possible. The majority of organisms will be found in the periphery of a caseous lesion. As large a specimen as possible should be sent. Microscopy is generally not performed on swabs.

## Comment:

Microscopy and culture performed routinely Monday to Friday 9-5pm. If smear results are desired on the same day that the specimen is submitted, the specimen should reach the laboratory before 3pm and the TB laboratory notified.

For the initial diagnosis of mycobacterial infection all specimens should be fresh and taken when possible before anti-tuberculosis treatment is started. Specimens should be transported as soon as possible. Specimens other than blood should be refrigerated if transport to the laboratory or specimen processing is delayed for more than 1 hour. For body fluids use a sterile, leakproof, disposable plastic container. Swabs should be transported in Amies transport medium with charcoal. Laryngeal swabs are not recommended and only be used when pus or sputum is unobtainable.

Isoniazid, rifampicin and ethambutol susceptibility reported where appropriate.

Pyrazinamide and streptomycin susceptibility testing performed in IMRL, St James’ Hospital.

## Turnaround:

**Microscopy:** 24-72 hours

**Culture:** 6-8 weeks

Positive smear and culture results are telephoned to requesting clinician.
**Mycology – Fungal Microscopy and Culture (Dermatophytosis – skin, hair, nails)**

**Laboratory:** Microbiology (Mycology section)

**Specimen:** Scalp specimens are best obtained by scraping with a blunt scalpel. The contents should include hair stubs, the contents of plugged follicles and skin scales. Hair may also be plucked from the scalp with forceps (infected hairs are usually easy to remove in this way). Cut hairs are unsatisfactory as the focus of infection is usually below or near the surface of the scalp.

Nail clippings should be taken from any discoloured, dystrophic or brittle parts of the nail. These should be cut as far back as possible from the free edge of the nail and include its full thickness, scrapings can also be taken from beneath the nail to supplement the clipping specimen.

Skin specimens should be collected by scraping outwards from the edges of the lesions, with either a blunt scalpel blade or with the edge of a glass microscope slide. The edge of the lesion is where there is likely to be the most fungus.

**Comment:** Some general points on specimen collection are given below:

- It is often helpful to clean the lesions of the skin or scalp (and sometime nail) with surgical spirit or 70% alcohol prior to collection of specimens as this improves the chances of detecting the fungus by microscopy and also reduces the likelihood of contamination of subsequent cultures. Prior cleaning is essential if greasy ointments or powders have been applied to the region.
- Transport at room temperature.
- Do not use fixatives.

All specimens should be collected and transported in a properly labelled, sealed sterile container i.e. universal containers, Mycological Transport Pack or glass slides in the appropriate slide holder. Loose slides should not be used. The use of clear sticky tape (sellotape) is not recommended.

**Important note:** If you clinically suspect Hendersonula toruloidea which causes dermatophyte-like lesions of the palms, soles and toe-webs or Tinea nigra, which is a rare condition which causes dark pigmented areas, usually on the skin of the palm, and is clinically distinctive from dermatophyte lesions, please inform the laboratory when sending skin samples for analysis.

**Test method:** Keratinised tissues are treated with potassium hydroxide in the laboratory to detect hyphae of dermatophytes. Many pathogenic fungi will grow slowly on conventional media but may be recovered more reliably on special fungal media, which require incubation for up to 4 weeks. Some isolates may require referral to the Mycology Referral Laboratory in Bristol for identification and/or susceptibility testing which can take up to an additional 4 weeks.

**Turnaround:**
- Direct smear: 1 week.
- Culture: 1-3 weeks

**Report:**
- Direct smear: Fungal elements seen or not seen. Typical microscopic appearance indicates fungal infection but does not identify the particular fungal species. Culture of yeast or fungus provides species identification.
- Positive microscopy is diagnostic for a fungal infection, however a negative microscopy result does not exclude a diagnosis of fungal infection.
- Culture: Fungus not isolated or organism name isolated

**Mycoplasma pneumoniae IgM**

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

**Comment:** Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin). Test is validated only for patients less than or equal to 20 years of age.

**Turnaround:** 5 days

**Report:** Positive or negative

### Mycophenolic Acid

**Laboratory:** Sample referred from Clinical Biochemistry to Harefield Hospital

**Specimen:** 0.5ml Plasma EDTA, plasma needs to be separated within 6 hours.

**Comment:** 12 hour trough level

**Turnaround:** 2 weeks

**Therapeutic Range:** Interpretation of Mycophenolic Acid is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement

### Myeloperoxidase Antibodies

**Laboratory:** Autoimmune Serology

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

**Comment:** Quantitative Elisa

**Turnaround:** 72 Hours

**Ref. Range:** 0 - 20 AU/mL

### Neck Dissection Specimens

**Laboratory:** Histopathology (Diagnostic Laboratory)

**Specimen:** Formalin fixed tissue

**Comment:** Cork boards and pins are available from the Histopathology Specimen reception at ext. 22792 for orientation of these specimens. The specimen should be accompanied by a detailed diagram on/attached to the Request Form designating the appropriate levels/landmarks required for correct gross handling of the case.

**Turnaround:** 80% of cases by day 7

### Neisseria gonorrhoea PCR

**Laboratory:** Microbiology

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

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

Specimens received for Neisseria gonorrhoea PCR will also be tested for Chlamydia tracomatis DNA.

The assay is verified for use with female Endocervical swab specimens, High Vaginal Swab specimens and male/female Urine specimens. The preferred specimen type for N. gonorrhoea testing in female patients is urine due to increased sensitivity and fewer problems during specimen processing.

Underfilled or overfilled Urine specimen containers are unsuitable for testing. Endocervical/HVS specimen tubes with no swab or with two swabs cannot be tested.

Specimens that appear bloody or have a dark brown colour are unsuitable for testing (may give false negative results).

The presence of mucous may inhibit PCR and cause false negative test results. Mucous free specimens are required for optimal test performance.

Do not use collection devices beyond their expiry date.

**Turnaround:** 96 - 120 hour

**Report:** RT: PCR *Neisseria gonorrhoea* Target Not Detected or Target Detected.

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

The assay is only verified for use with female Endocervical/HVS swab specimens and male/female Urine specimens. Results from other specimen types should be interpreted with caution.

**Neisseria meningitidis PCR**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Infectious Diseases Serology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>1mL EDTA blood, CSF (0.5mL)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Performed by Irish Meningitis &amp; Sepsis Reference Laboratory (IMSRL), Dublin. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>Samples received by IMSRL before 11am, result between 4pm and 5pm the same day</td>
</tr>
<tr>
<td>Report:</td>
<td>Detected or not detected</td>
</tr>
</tbody>
</table>

**Nerve Biopsy**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Neuropathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Fresh nerve (universal precautions)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Please refer to the nerve biopsy protocol (Neuropathology Information for Users). The biopsy site should be chosen by the primary care physician. In general, the sural nerve is the most frequently biopsied nerve. A fascicular or complete nerve biopsy can be done. In practice approximately two centimetres of the entire nerve including the perineurium is cut. The laboratory should be notified in advance that a nerve biopsy is en route. It should be sent immediately FRESH to the Neuropathology Dept. Universal safety precautions for fresh tissue should apply. For specimens which have to be sent over a distance (e.g. Bantry, Mallow etc.) the biopsy can be wrapped in gauze lightly moistened with NORMAL SALINE, to keep moist during transport. Telephone ext 021 4922519 to let us know the biopsy is en route. The biopsy should be delivered directly to a staff member in the Neuropathology Dept. Sample should be packed according to Packing Instruction 650. Taxi driver/courier should be instructed not to leave specimen at laboratory reception and also instructed in how to deal with spillages. The nerve biopsy should reach the department by 4.00pm. On receipt of the specimen a staff member will telephone the referring hospital laboratory to confirm that the tissue has arrived safely. Please indicate on the Neuropathology request form the clinician to whom the result should be sent and if a copy is needed for another clinician. The primary care team should fill out the clinical details on the request form before the patient goes to theatre. For any further queries please contact the Neuropathology laboratory (021 4922519) or Dr Bermingham (021 4920475).</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks. Certain cases may take longer.</td>
</tr>
</tbody>
</table>

**Neuroblastoma Screen (Catecholamines and Metanephrines)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred to Beaumont Hospital, Dublin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Fresh spot urine (20 mL, if possible). MUST be acidified in lab within 10 minutes of collection.</td>
</tr>
<tr>
<td>Comment:</td>
<td>Please notify the Biochemistry laboratory in advance. State what drugs the patient (&lt;16 years) is on during collection.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks.</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Contact CUH Clinical Biochemistry Laboratory</td>
</tr>
</tbody>
</table>
### Neuromuscular genetics (HNPP, CMT, DM, DMD, FA, SCA etc)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Referred from Molecular Genetics lab in Biochemistry to NCMG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>3ml EDTA blood</td>
</tr>
<tr>
<td>Comment:</td>
<td>Contact 22531 for further information&lt;br&gt;Please note: invoices will be issued to the referring clinician for tests not performed in NCMG.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>See website: <a href="http://www.genetics.ie">www.genetics.ie</a></td>
</tr>
<tr>
<td>Report:</td>
<td>Sent to referring clinician and copy of report filed in pathology</td>
</tr>
</tbody>
</table>

### Neurosurgical Biopsies (Routine)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Neuropathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Formalin-fixed tissue</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>5 days</td>
</tr>
</tbody>
</table>

### Neurosurgical Biopsies (High-Risk)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Neuropathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Formalin-fixed tissue</td>
</tr>
<tr>
<td>Comment:</td>
<td>Special precautions are required for investigation of atypical dementia and other high-risk, infectious cases. Biohazard labels must be used. Contact the Neuropathologist on duty (22520).&lt;br&gt;N.B. Suspected prion disease cases are examined in the CJD surveillance centre in Beaumont Hospital 01 8377755</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>N/A, case dependent</td>
</tr>
</tbody>
</table>

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

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

### Nose Swab

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Main laboratory)</th>
</tr>
</thead>
</table>
| Specimen:   | Specimen anterior nares gently rotating the swab on the surface. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature.  
Aerobic culture – To detect nasal carriage of bacteria, especially *Staphylococcus aureus* during an outbreak of staphylococcal infection. Test performed routinely Monday to Friday 9-5pm or by urgent request. |
| Comment:    | Processed routinely on <12 years or with relevant clinical details (recurrent boils, infected eczema, impetigo or renal patients).  
Presence of *Staphylococcus aureus* usually reflects carrier state. |
| Turnaround: | Prelim: 24 hours; Final: 48-72 hours |
| Report:     | |

### Oestradiol

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>4 Days</td>
</tr>
</tbody>
</table>

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This document is designed for online viewing. Printed copies, although permitted, are deemed Uncontrolled from 23:59 hours on 28/09/18
Ref. Range: Follicular phase: 77 – 922 pmol/L
Ovulation: 140 - 2383 pmol/L
Luteal: 77 - 1145 pmol/L
Post Menopause: 37 - 103 pmol/L
Males: 40 - 162 pmol/L

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

Ophthalmic Biopsies
Laboratory: Neuropathology
Specimen: Formalin fixed tissue
Turnaround: 5 days

Ophthalmic Biopsies – corneal smears (acanthamoeba)
Laboratory: Neuropathology
Specimen: Corneal scrape – special fixative required, (CytoLyt), available from Neuropathology.
Comment: Please contact Neuropathology Department in advance on 4922520
Turnaround: 1-2 days

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

Organic Acids
Laboratory: Sample referred from Clinical Biochemistry to The Children’s Hospital, Temple Street, Dublin
Specimen: Spot Urine
Comment: Sample must be frozen immediately
Turnaround: 1 week
Ref. Range: See report or contact Biochemistry Laboratory Temple Street Hospital

Osmolality (Serum)
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Turnaround: 24 Hours
Ref. Range: 275 – 295 mOsm/kg

Osmolality (Urine)
Laboratory: Clinical Biochemistry
Specimen: Spot urine sample
Turnaround: 24 Hours
Ref. Range: Dependant on the patient’s state of hydration

Ovarian Antibodies
Laboratory: Sample referred from Autoimmune Serology to Eurofins-Biomnis Laboratories
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Turnaround: Approx. 3 Weeks
**Oxidative Burst analysis**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Specimen referred directly from ward (through Stores department) to Haematology, Our Lady’s Hospital Crumlin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL, purple, Vacuette® (EDTA) Specimen must reach referral laboratory within 3 1/2 hours of phlebotomy, and delivery is organised with Stores Department to be sent by taxi at 8.00 am. Sample must be taken between 07:30 and 08:00</td>
</tr>
<tr>
<td>Comment:</td>
<td>Requested by Consultant Haematologist</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Report:</td>
<td>See referral laboratory report</td>
</tr>
</tbody>
</table>

**PAI-1 (Plasminogen Activator Inhibitor)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Haematology to Eurofins-Biomnis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x 3 fill to mark on tubes</td>
</tr>
<tr>
<td>Comment:</td>
<td>Request must be booked in advance with the Haematology Laboratory CUH. (PAI-1) is an important component of the coagulation system that down-regulates fibrinolysis in the circulation. Reduced PAI-1 levels may result in increased fibrinolysis and an associated bleeding diathesis. A combined request/consent form as part of the new EU GDPR rules is required to be completed and is available on the Eurofins website</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>40 days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See referral lab report</td>
</tr>
</tbody>
</table>

**Pancreatic Islet Cell Antibodies**

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

**Paracetamol**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in or plain tube (clotted sample)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Sample 4 – 12 Hours post ingestion</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 Hour 15 mins</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Interpretation of Paracetamol toxicity is highly dependent on time of putative overdose. Refer to nomogram</td>
</tr>
</tbody>
</table>

**Paraneoplastic screen (See anti-neuronal antibodies)**

**Parasitology (enteric) – Ova, Cysts and Parasites (OCPs)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Microbiology (Category 3 Laboratory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Fresh faeces specimen in a sterile leak-proof container. Do not refrigerate or incubate specimens. Three examinations spaced 2-3 days apart are recommended for best recovery of parasites. Unless the patient has severe diarrhoea or dysentery, no more than one specimen should be examined within a single 24-hour period, as shedding of cysts and ova tends to be intermittent. If <em>Entamoeba histolytica</em> or <em>Giardia lamblia</em> are suspected and the first 3 specimens are negative, ideally 3 additional specimens should be submitted at weekly intervals.</td>
</tr>
</tbody>
</table>

*Note: Fresh specimens are essential for the examination of trophozoites. Transport specimens ASAP. Protozoan trophozoites will not survive if the specimen dries out. Cysts will not form once the specimen has been passed.*
Comment:  
Full clinical details are essential. Faeces specimens from patients with chronic diarrhoea, patients with a history of foreign travel, immunocompromised patients or FMT (Faecal Microbiota Transplant) patients will be processed. If in doubt, please contact the medical staff. Please indicate if specific organisms are sought. Specifically indicate on the request form if Cyclospora or Microsporidia are sought. Oocysts of Cryptosporidium spp. can be identified with special staining techniques; (Cryptosporidium parvum/hominis detected via molecular techniques in faeces) their presence may indicate active infection or carriage.

Turnaround:  
Faeces specimens for ova/parasites will be examined 2-3 times a week depending on staff availability.

Report:  
OCP not seen or a report on any parasites seen.
The presence of white or red cells is significant and indicates mucosal inflammation.
Diagnosis of amoebic colitis requires the presence of Entamoeba histolytica trophozoites containing ingested red cells.
Cysts or trophozoites of Giardia intestinalis confirm a diagnosis of giardiasis.
The presence of characteristic ova can identify infection with hookworms and other roundworms (nematodes) e.g. Enterobius vermicularis in sticky tape preparations, Ascaris lumbricoides; flat flukes (trematodes) e.g. Fasciola hepatica, tape worms e.g. Taenia saginata, Taenia solium. Occasionally complete worms are passed, enabling specific identification of the adult worm.

Parechovirus Molecular

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: Respiratory secretions, stool, CSF
Comment: Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
Turnaround: 5 working days
Report: Detected or not detected

Parvovirus B19 IgG and IgM

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

PCP (Pneumocystis jirovecii)

Laboratory: Histopathology (Cytology Department)
Specimen: Bronchial lavage (neat or in cytolyt)
Comment: Tests are performed routinely Monday to Friday during routine working hours Samples can be processed as urgent with prior communication with laboratory.
Ref. Range: Not applicable

Penile swab

Refer to Genital swab

Pericardial Fluid / Peritoneal Fluid / Pleural Fluid

See Sterile Body Fluid – Microscopy and Culture

Perinatal: Placenta, Products of Conception, Ectopic Pregnancies

Laboratory: Histopathology (Diagnostic Laboratory)
Specimen: Formalin fixed tissue. Immediately placed in 10% Buffered Formalin and please state date and time specimen taken.
Peritoneal Dialysis Fluid
See Continuous Ambulatory Peritoneal Dialysis Fluid

Pernasal Swab / Pertussis
See Bordetella species – Culture

PFA 100 (Platelet Aggregation Screen)
Laboratory: Haematology
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x2. Specimens must be sent to the Haematology Lab. Within 2 hours of collection.
Samples must not be sent in the pneumatic tube system.
Patients on aspirin are unsuitable for this test.
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling
Specimens with platelet counts <150 x 10⁹/l are unsuitable for testing.
Comment: Test available Mon-Fri before 4pm hours by arrangement with the Haematology dept. The process of platelet adhesion and aggregation following a vascular injury is simulated in vitro, based on change in vacuum /pressure brought about by platelet plug formation. The most common causes of platelet dysfunction are related to uremia, von Willebrand disease and exposure to agents such as acetyl salicylic acid.
Turnaround: 8-24 hours
Ref. Range: Collagen/Epinephrine 82 – 150 secs Collagen/ ADP 62 – 100 secs

Phaeochromocytoma & Paraganglioma Genetic Screen
Laboratory: Referred from molecular genetics lab in Biochemistry to LEEDS NHS via NCMG
Specimen: 3-5ml EDTA blood
Comment: NCMG request form available at www.genetics.ie
Please note: invoices will be issued directly to the referring clinician.
Turnaround: 40 days for 8 gene screen
Report: Sent to referring clinician and copy filed in pathology

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

Phenobarbitone / Phenobarbital
Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent
Turnaround: 4 Days. Urgents on request
Ref. Range: Therapeutic Range 10-40 mg/L (Adult) Range quoted is appropriate for a trough sample.
Febrile convulsion in children - Range 15-20 mg/L

**Phenotyping Red Cell Antigens**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Blood Transfusion Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>1 X 6 mL EDTA Pink Capped Tube</td>
</tr>
<tr>
<td>Comment:</td>
<td>Phenotypic analysis of patient red cell antigens (e.g. male partners of antenatal patients found to have developed red cell antibodies during pregnancy in the prediction of HDNB)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 Hours</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

**Phenytoin**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 Day</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Therapeutic Range 5-20mg/L Range quoted is appropriate for a trough sample.</td>
</tr>
</tbody>
</table>

**Phosphate (Blood)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Haemolysis invalidates result</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>Adult Range: 0.8 – 1.5 mmol/L Paediatric Range: 1.25 – 2.25 mmol/L Up to 1 month 1.15 – 2.15 mmol/L 1 – 12 months 1.95 mmol/L 1 – 3 years 1.00 – 1.80 mmol/L 3 – 15 years</td>
</tr>
</tbody>
</table>

**Phosphatase (Urinary)**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>24 Hour urine collection, to be acidified as soon as possible in laboratory.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 Day</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>12.9 – 42 mmol/24 Hr</td>
</tr>
</tbody>
</table>

**Pinworm**

See *Enterobius vermicularis*
Platelet Aggregation Tests

Laboratory: Haematology
Specimen: Six (minimum) Blood 3mL; blue Vacuette® (sodium citrate 3.2%). Samples must not be sent in the pneumatic tube system. Specimens must be sent to the Haematology Lab. within 2 hours of collection. Patients on aspirin are unsuitable for this test. Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling. Specimens with platelet counts <150x109/l are unsuitable for testing.

Comment: Test available Mondays only, by prior arrangement with the Haematology dept. The process of platelet adhesion and aggregation following a vascular injury is simulated in vitro, and the platelets aggregates, which form as a result of being exposed to collagen, ristocetin, ADP and adrenaline, are detected by changes in light transmittance. The most common causes of platelet dysfunction are related to uremia, von Willebrand disease and exposure to agents such as acetyl salicylic acid.

Turnaround: 8-24 hours,
Ref. Range: N / A, reported as Normal / Reduced / No Response / Inconclusive

Platelet Antibody Investigation

Laboratory: Blood Transfusion Laboratory
Specimen: 1 x 4 ml Clotted sample (red cap with yellow ring).
Comment: Referred to: I.B.T.S., National Blood Centre, James’s St., Dublin 8. Complete the Blood Transfusion request forms LF-C-BTR-ANTENAT or LF-C-BTR-XMATCH
This is not an INAB accredited test.

Turnaround: 3 weeks
Ref. Range: Not applicable.

Pneumococcal Antibodies (IgG)

Laboratory: Clinical Biochemistry
Specimen: Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment: Test performed by reference laboratory (HPA Laboratory, Manchester).

Turnaround: 2-3 weeks
Report: Refer to specific laboratory report

Pneumococcal PCR

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 1mL EDTA blood, CSF (0.5mL)
Comment: Performed by Irish Meningitis & Sepsis Reference Laboratory (IMSRL), Dublin. Please ensure the specimen reaches the laboratory by 4pm to ensure prompt delivery to the reference laboratory.

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

PNH Paroxysmal nocturnal haemoglobinuria

Laboratory: Referred by Haematology to Haematology, St James Hospital, Dublin 8
Specimen: Blood 2 x 3mL, purple Vacuette® (EDTA).
Comment: Test available Monday to Wednesday, before 12.00 noon. PNH is characterised by intermittent intravascular haemolysis due to hypersensitivity of RBC’S to the haemolytic action of complement caused by the lack of proteins DAF and MIRL. Diagnosis is possible by using monoclonal antibodies where the abnormal RBC population is identified by agglutination technique.
Polio Antibodies

Laboratory: Clinical Biochemistry
Specimen: Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment: Test performed by reference laboratory (Respiratory Infections Laboratory, Colindale, London).
Turnaround: 4 weeks

Porphyrin Screen

Laboratory: Sample referred from Clinical Biochemistry to St. James Hospital Dublin
Specimen: Spot urine sample
Faeces sample
EDTA whole blood sample
Lithium Heparin plasma sample
Comment: All samples must be protected from light at all times using tinfoil
Turnaround: 3 weeks
Ref. Range: See report or contact Biochemistry Dept. St James’ Hospital

Post-Mortems
See Autopsies/Post-Mortems Section 3.5 Dept. of Pathology

Potassium (Blood)

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Haemolysis invalidates result
Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days.
Ref. Range: 3.5 – 5.0 mmol/L (Plasma Potassium 3.4-4.5 mmol/L)

Potassium (Urinary)

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

Pouch of Douglas Fluid
See Sterile Body Fluid – Microscopy and Culture

Prader Willi Syndrome (PWS)

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

Pregnancy Tests

Laboratory: Haematology
Specimen: Fresh Urine Specimen (must be <48 hrs old, preferably refrigerated), early morning specimen recommended.
Comment: Urine tests for confirming pregnancy are based on detecting elevated levels of human chorionic gonadotropin (HCG) which the placenta begins to produce in increasing amounts about 10 days after fertilisation. Test available Monday to Friday during routine working hours and for emergency reasons at all other times.
Turnaround: Emergency specimens: 30 minutes
Routine specimens: 8 - 24 hours
Ref. Range: Positive or Negative or Inconclusive

**Progestrone**

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample). For evidence of ovulation draw blood 7 days prior to expected day of menstruation. Confirm correctness of timing at subsequent menses.

Turnaround: 4 Days

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

**Prolactin**

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

Turnaround: 4 Days

Ref. Range: Female: 110 - 562 mU/L;  Male: 73 – 411 mU/L

**Propoxyphene**

Laboratory: Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday. Specimen: Spot urine

Comment: See Toxicology / Drug Screen

Turnaround: 1 week

Ref. Range: See report form or contact Toxicology Laboratory BEAUMONT Hospital 01-8092673 / (01)8092675, Emergency after hours (087) 2590749, Fax (01)8093986

**Protein (Total)**

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

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

Ref. Range: 62 – 82 g/L Please contact Clinical Biochemistry lab for Paediatric and Pregnancy-related Reference ranges.

**Protein (Urinary)**

Laboratory: Clinical Biochemistry
Specimen: Spot or 24 Hr sample

Turnaround: 1 Day

Ref. Range: < 140 mg/24hr

**Protein C**

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

Comment: Test available Monday to Friday during routine working hours, and for emergency reasons by arrangement. In this assay the Protein C present in the test plasma is activated by an enzyme, this in turn hydrolyses a chromogenic substrate which is then measured. Decreased levels are reported in congenital abnormalities, also in patients with hepatic disorders, those receiving oral anticoagulants and in cases of DIC. Congenital abnormalities often result in severe recurrent venous thrombosis. This assay forms part of the Thrombophilia screen, see Main Haematology Section on
Guidelines for Investigation of Thrombophilia.

**Samples must be received within 4 hours**

**Protein S**

- **Laboratory:** Haematology
- **Specimen:** Blood 3mL; blue Vacuette® (sodium citrate 3.2%). Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
- **Comment:** Test available Monday to Friday, during routine working hours. Protein S is a vitamin K dependent protein, which serves as a co-factor for the anticoagulant activity of activated protein C in the degradation of factors V and VIII. This assay forms part of the Thrombophilia screen, see Main Haematology Section on Guidelines for Investigation of Thrombophilia.

**Turnaround:** 3 – 4 weeks

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean (%)</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>35</td>
<td>17 - 53</td>
</tr>
<tr>
<td>Day 5</td>
<td>42</td>
<td>20 - 64</td>
</tr>
<tr>
<td>Day 30</td>
<td>43</td>
<td>21 - 65</td>
</tr>
<tr>
<td>Day 90</td>
<td>54</td>
<td>28 - 80</td>
</tr>
<tr>
<td>Day 180</td>
<td>59</td>
<td>37 - 81</td>
</tr>
<tr>
<td>Adult</td>
<td>95</td>
<td>70 - 120</td>
</tr>
</tbody>
</table>

**Protein/Creatinine Ratio (Urinary)**

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

**Prothrombin DNA Mutation Studies (G20210A)**

- **Laboratory:** Haematology Molecular Genetics
- **Specimen:** Blood 3mL purple Vacuette® (EDTA)
- **Comment:** Forms part of a Thrombophilia screen.
- **Turnaround:** 6 - 8 weeks
- **Ref. Range:** Normal / Heterozygous / Homozygous, see report

**Prothrombin Time (PT)**

- **Laboratory:** Haematology
- **Specimen:** Blood 3mL, blue Vacuette® (sodium citrate 3.2%) Specimens which are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.
- **Comment:** Test available Monday to Friday, during routine working hours and for emergency reasons at all other times. The test is used as a screen to detect (a) single or combined deficiencies of
the extrinsic coagulation system, (b) liver disease (c) vitamin K deficiency (d) monitoring oral anticoagulants, (e) assaying the specific coagulation Factor II. It also forms part of the Thrombophilia and/or Lupus screen.

Specimens must be received within 48hrs

Many commonly administered drugs may affect the results. This should be kept in mind especially when unusual or unexpected results have been obtained.

'The prothrombin time (measured in seconds) is a very sensitive test to advancing liver disease in patients with liver disorders. The PT ratio – the patients PT over the midpoint of the normal range is useful. The laboratory recognises that some protocols dealing with liver disease and paracetamol overdose use the INR. This is a less sensitive measure of liver disease as it is adapted for patients on warfarin.

<table>
<thead>
<tr>
<th>Turnaround:</th>
<th>Urgent specimens: 2 hours</th>
<th>Wards: 8 hours</th>
<th>GPs: 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref. Range:</td>
<td>Age</td>
<td>Mean</td>
<td>Range (seconds)</td>
</tr>
<tr>
<td>Day 1</td>
<td>13.0</td>
<td>10.1 – 15.9</td>
<td></td>
</tr>
<tr>
<td>Day 5</td>
<td>12.4</td>
<td>9.5 – 15.3</td>
<td></td>
</tr>
<tr>
<td>Day 30</td>
<td>11.8</td>
<td>9.3 – 14.3</td>
<td></td>
</tr>
<tr>
<td>Day 90</td>
<td>11.9</td>
<td>9.6 – 14.2</td>
<td></td>
</tr>
<tr>
<td>Day 180</td>
<td>12.3</td>
<td>10.7 – 13.8</td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>10.5</td>
<td>9.7 – 11.3</td>
<td></td>
</tr>
</tbody>
</table>

**PSA Total**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in plain tube (clotted sample)</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>4 Days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>0 – 4.0 µg/L</td>
</tr>
</tbody>
</table>

**PTH**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL EDTA plasma</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>1 week</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>15 – 68 ng/L</td>
</tr>
</tbody>
</table>

**Purines & Pyrimidines**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Referred from Biochemistry to the Purine Research Lab, St. Thomas’s Hospital, London</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Spot Urine (5-10mls) on ice – must be frozen immediately. EDTA blood (2-5mls)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Consultant request only</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>4 Weeks</td>
</tr>
</tbody>
</table>

**Pyruvate Kinase**

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Haematology to The Red Cell Centre, King’s College Hospital, London, SE5 9RS Westminster Bridge Rd., London</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 3mL, purple Vacuette® (EDTA), minimum 1 mL.</td>
</tr>
<tr>
<td>Comment:</td>
<td>Request must be booked in advance with the Haematology Laboratory CUH, performed as part of the investigations into haemolytic anaemias.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>60 days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See referral laboratory report or contact King’s College London, 0044 2032 999000</td>
</tr>
</tbody>
</table>

**Q Fever**

See *Coxiella burnetii* IgG and IgM

**QuantiFERON®-TB Gold Plus test (QFT)**
**Laboratory: Microbiology (TB Laboratory)**

**Specimen:** Special kit available from the Microbiology Laboratory after prior agreement with medical team. Please follow the manufacturer's instructions supplied with the kit.

**Note:**
1. Fill to black mark on tube; under or overfilled bottles are not accepted. Immediately after filling tubes shake 10x times; just firmly enough to ensure the entire inner surface of the tube is coated with blood to dissolve antigens on tube walls.
3. Return the complete kit (in box) accompanied by a green Microbiology request form.

**Comment:** Errors in collecting or transporting blood specimens can decrease the accuracy of QFT. Do not refrigerate the kit at any time. Blood specimens must be processed as soon as possible after collection while white blood cells are still viable. Before the QFT is conducted, confirm arrangements for testing with the laboratory.

Specimens are only accepted by this laboratory Monday to Thursday before 2pm (excluding Bank Holidays).

Test performed by reference laboratory (Eurofins Biomnis, Sandyford Industrial Estate).

**Turnaround:** 1 week

**Report:** Positive (≥0.35), negative (<0.35) or indeterminate.

A positive result suggests that *M. tuberculosis* infection is likely; a negative result suggests that infection is unlikely; and indeterminate result suggests QFT-G results cannot be interpreted as a result of low mitogen response.

A positive result does not distinguish between active and latent infection. A repeat will be requested where samples are close to 0.35 cut-off.

**Renal Biopsy**

**Laboratory:** Histopathology (Renal Pathology/Electron Microscopy Department)

**Specimen:** Renal Biopsy (unfixed tissue)

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

It is essential to inform the laboratory in advance of the date and approximate time of the procedure at Ext.21315 or bleep 379.

On the day of the procedure, the specimen container for the biopsy is collected from the EM/Renal laboratory. This consists of a universal container with filter paper soaked in Phosphate Buffered Saline, into which the tissue is placed directly after the procedure.

The tissue is then brought to the Renal/EM department, where it is handed directly to a medical scientist. The specimen is divided into portions for Light Microscopy, Direct Immunofluorescence Microscopy and Electron Microscopy in the EM/Renal Lab.

**Turnaround:** 80% cases verbal report in 2 days

80% cases fully authorised report in 2 weeks

**Renal Stone**

**Laboratory:** Sample referred from Clinical Biochemistry to the Mater Hospital Dublin.

**Specimen:** Renal Stone

**Comment:** Renal Stone assayed for NH4, Uric acid, Cystine, CO2, Oxalate, Calcium, Phosphate, Magnesium

**Turnaround:** 1 month

**Ref. Range:** See report or contact Biochemistry Dept. Mater Hospital
Renin: See Aldosterone/Renin ratio

**Respiratory Syncytial Virus (RSV) Antigen**

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

**Respiratory Viral Screen (Molecular)**

- **Laboratory:** Microbiology
- **Specimen:** Viral swab (nasopharyngeal, nose, throat), nasopharyngeal aspirate, sputum, broncho-alveolar lavage
- **Comment:** During Influenza season a Respiratory viral screen for Adenovirus, Influenza A and B, Respiratory Syncytial Virus (RSV), Parainfluenza, Human Metapneumovirus, Rhinovirus, Bocavirus & M. *pneumoniae* is performed in CUH. Influenza A & B, RSV and Human metapneumovirus are INAB accredited tests.
  
  Specimens may be refered to a reference laboratory (National Virus Reference Laboratory) out of influenza season or if testing is at maximum capacity in CUH. This screen includes the same viruses as tested in CUH with additional testing, including Enterovirus, Parechovirus, *C. pneumoniae* & coronaviruses. For immunocompromised patients, Herpes Simplex Virus 1/2 and Cytomegalovirus may also be included in screen.

  A rapid Influenza A/B test is available when clinically indicated, but only when requested through consultation with the medical microbiology team. Only viral swabs will be accepted for this rapid test.

- **Turnaround:** 5 working days
- **Report:** Detected or not detected

**Reticulocyte Count**

- **Laboratory:** Haematology
- **Specimen:** Blood 3mL purple Vacuette® (EDTA) Paediatric (1mL purple (EDTA) or 1.3 mL red)
- **Comment:** The number of reticulocytes present in blood is an index of RBC production by the bone marrow. Specimen must be <12 hours

  - **Turnaround:** Emergency specimens: < 2 hours Routine specimens: 8 - 24 hours
  - **Ref. Range:**
    - 1 day: 110 - 450 x 10⁹/l 1 Year: 30 - 130 x 10⁹/l
    - 14 days: 10 - 80 x 10⁹/l 12 years: 30 - 130 x 10⁹/l
    - 2 months: 30 - 200 x 10⁹/l Adult: 23– 93 x 10⁹/l

**Rheumatoid Factor IgM**

- **Laboratory:** Autoimmune Serology
- **Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)
- **Comment:** Quantitative Nephelometric assay.

- **Turnaround:** 24 Hours
- **Ref. Range:** 0 - 14 IU/mL

**Ribosomal P Protein**

- **Laboratory:** Autoimmune Serology
- **Specimen:** Blood, 4 mL red top Vacuette (or similar container for clotted blood)
- **Comment:** Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Rickettsia Antibodies

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (Rare & Imported Pathogens Laboratory (RIPL), Porton Down)
Turnaround: 3 weeks
Report: Positive or negative

Ro (SS-A)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround: 72 Hours
Ref. Range: Not applicable

Rotavirus / Adenovirus Assay

Laboratory: Microbiology (Category 3 Laboratory)
Specimen: Fresh faeces specimen. 1-2g is sufficient.
Comment: Immunochromatographic test using anti-Adenovirus monoclonal and anti-Rotavirus monoclonal reagents. Test performed Monday to Friday 9-5pm on children ≤5 years.
Turnaround: 24 hours.
Positive reports are telephoned when available to the requesting area.
Report: Positive or negative for Rotavirus and Adenovirus

Rubella IgG Antibody

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: This test is used in the determination of immune status to Rubella. Typically, this test is done as part of an antenatal or occupational health screen. Rubella IgM testing is recommended for the diagnosis of recent primary rubella infection.
Turnaround: 36 hours
Report: Quantitative value IU/mL

Rubella IgM Antibody

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

Salicylate

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

Laboratory: Microbiology (Category 3 Laboratory)
Specimen: Collection of a terminal urine specimen is recommended (between 10am and 2pm as this is the period of maximum schistosomal activity). Sterile containers without boric acid must be used. In patients without haematuria, eggs may be trapped in the blood and mucus in the terminal portion of the urine specimen. Transport specimens ASAP. Delays of over 48 hours are undesirable.

Comment: Test performed Monday to Friday 9-5pm. If the urine cannot be examined within an hour of collection, it is advisable to add 1mL of undiluted formalin to preserve any eggs that may be present.

Turnaround: 24 hours
Report: Schistosoma spp. Not seen or Schistosoma seen

Schistosoma Antibodies (Bilharzia)

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: 4mL clotted blood
Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London).

Turnaround: 3 weeks
Report: Positive or negative

SCL-70

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.

Turnaround: 72 Hrs
Ref. Range: Not Applicable.

SHBG

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: SHBG is analysed (females only) in conjunction with testosterone. Androgen index (AI) is then calculated.

Turnaround: 2 Weeks
Ref. Range: Male 13-71 nmol/L; Female 19.8-115 nmol/L   AI < 11  (female)

Sirolimus

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

Turnaround: 2 weeks
Ref. Range: Interpretation of Sirolimus is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement

Skin for Fibroblast Culture (Paediatric Neurology cases)

Laboratory: Neuropathology
Specimen: 3x3mm skin bx taken into sterile culture medium
Comment: Please contact Neuropathology in advance. Culture medium available from Neuropathology Lab. Sample sent to Sheffield Children’s Hospital. Protocols available on request.

Turnaround: 8-12 weeks but may be longer depending on rate of cell line growth.
Ref. Range: N/A

Skin Swab
See Wound Swab

Sm (Smith Antigen)
| Laboratory: Autoimmune Serology | Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood) | Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera. | Turnaround: 72 Hours | Ref. Range: Not applicable |
| Small Round Structured Viruses (SRSV) | See Norovirus |
| Smooth Muscle Antibodies | Laboratory: Autoimmune Serology | Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood) | Comment: Qualitative Immunofluorescence assay initially part of Auto Antibody Screen. Positive sera are titred to end point. Sera showing specific Anti-Actin pattern on Immunofluorescence are commented upon. | Turnaround: 72 Hrs. | Ref. Range: Not Applicable |
| Sodium (Blood) | Laboratory: Clinical Biochemistry | Specimen: 4.0 mL blood in plain tube (clotted sample) | Turnaround: A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx. GP or OPD- Results posted within 4 days. | Ref. Range: 132 – 144 mmol/L |
| Sodium (Urinary) | Laboratory: Clinical Biochemistry | Specimen: 24 Hr sample | Turnaround: 1 Day | Ref. Range: 130 – 220 mmol/24 Hr (reflects daily intake) |
| Spinal Muscular Atrophy (SMA) | Laboratory: Referred from Biochemistry to National Centre for Medical Genetics (NCMG) | Specimen: Infants: 1ml EDTA blood Adults 3-5ml EDTA blood | Comment: Copy of NCMG request form available on website [www.genetics.ie](http://www.genetics.ie) | Turnaround: 6 weeks | Report: Sent to referring clinician and copy of report filed in pathology |
| Sputum Culture | Laboratory: Microbiology (Main laboratory) | Specimen: Sputum from the lower respiratory tract expectorated by deep coughing. Check that specimen is of adequate quality as specimens of saliva and postnasal secretions are usually unsuitable. Ideally, the laboratory should receive a minimum volume of 1mL. The specimen should be collected into a clean, sterile, leakproof container. Sputum may be refrigerated for up to 2–3 hours without an appreciable loss of pathogens. Any delay beyond this time may allow overgrowth of Gram-negative bacilli, and *Haemophilus* species and *S. pneumoniae* may die. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. | Comment: Please include any appropriate clinical details e.g. “Cystic fibrosis patient”. If an unusual pathogen is suspected, the laboratory should be informed, *e.g. Burkholderia pseudomallei* and *Nocardia* sp require longer incubation of cultures. Refer to Mycobacteria testing for instructions for collection for TB culture. If a fungal infection is clinically suspected, please include as much information as possible regarding patient medical history, travel history and occupation, |
**Stem cell enumeration**

**Laboratory:** Haematology (Flow Cytometry department)

**Specimen:**

**Comment:**

**Turnaround:**

**Report:** CD34 Quantitation – stem cells detected per ml

**STD Screen**

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** 4mL clotted blood

**Comment:** Screen includes Hepatitis B Surface antigen, HIV Ag/Ab, Syphilis antibody

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

**Report:** Positive or negative

**Sterile Body Fluid – Microscopy and Culture**

**Laboratory:** Microbiology (Main laboratory)

**Specimen:** Specialist collection according to local protocols. Ideally, a minimum volume of 1mL should be collected into a clean, sterile, leakproof container. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. Results from delayed specimens must be interpreted with caution bearing in mind the difficulties in isolating anaerobes from these specimens. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

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

**Turnaround:** Microscopy: 2 hours. Culture: Prelim: 24 hours; Final: 48-72 hours. Urgent report telephoned when available.

**Report:** Total white cell count, differential leucocyte count (if appropriate), Gram Stain and Culture. All isolates are reported with appropriate sensitivities. Total white cell counts and differential leucocyte count are not performed on specimens containing a clot, which would invalidate the cell count.

**Striated Muscle Antibodies**

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

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

**Turnaround:** Approx. 3 Weeks

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

**Strongyloides Antibodies**

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** 4mL clotted blood

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

**Turnaround:** 3 weeks

**Report:** Positive or negative

**Strongyloides Microscopy and Culture**

**Laboratory:** Microbiology (Infectious Diseases Serology)

**Specimen:** Faeces
Comment: Performed by a reference laboratory (PHE National Parasitology Reference Laboratory (NPRL), London). Faecal specimens should NOT be refrigerated.

### Surgical Specimens for Histological Examination

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

### Sweat Test

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

### Synovial Fluid

See Sterile Body Fluid – Microscopy and Culture

### Syphilis Antibody

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood
- **Comment:** Sera positive by chemiluminescent immunoassay are further tested by RPR (rapid plasma reagin) and TPPA (*Treponema pallidum* particle agglutination). New syphilis positives are sent to a reference laboratory for confirmation.
- **Turnaround:** Negative: 36 hours
- **Ref. Range:** Contact CUH Biochemistry Laboratory

### Tacrolimus (FK506 / Prograf)

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in an EDTA tube
- **Comment:** Trough sample required. Analysed on Thursday.
- **Turnaround:** 1-2 days
- **Ref. Range:** Interpretation of Tacrolimus is dependent on time interval between sample and last dose, clinical indication for use of the drug, duration of therapy, other drug therapy and method of measurement.

### TB – See Mycobacteria testing

### Tear Duct – Culture

See Lacrimal

### Temporal Artery Biopsies

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

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

<table>
<thead>
<tr>
<th>Gender</th>
<th>&lt;50Y</th>
<th>50Y</th>
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<tbody>
<tr>
<td>Male</td>
<td>8.3</td>
<td>30.2</td>
</tr>
<tr>
<td>Female</td>
<td>0.48</td>
<td>1.85</td>
</tr>
</tbody>
</table>

Children: Please contact Laboratory for age-related Reference range

Tetanus antibodies (IgG)

Laboratory: Clinical Biochemistry
Specimen: Blood 4mL red top Vacuette® (or similar container for clotted blood)
Comment: Test performed by reference laboratory (Respiratory Infections Laboratory, Colindale, London).
Turnaround: 2-3 weeks
Report: Greater than 0.43IU/mL indicates previous exposure to tetanus toxoid.

Theophylline

Laboratory: Clinical Biochemistry
Specimen: 4.0 mL blood in plain tube (clotted sample)
Comment: Take trough sample immediately before next dose. When making comparative measurements, it is advisable that sampling times be consistent
Turnaround: 4 days. Urgents on request.
Ref. Range: Therapeutic Range 10-20 mg/L Range quoted is appropriate for a trough sample.

Throat Swab

Laboratory: Microbiology (Main laboratory)
Specimen: Swab the tonsillar area and/or posterior pharynx avoiding the tongue and uvula. Transport specimens ASAP in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature. If diphtheria or gonorrhoea is suspected special testing should be requested. Ideally, inoculation of specimens for N. gonorrhoeae is made directly on to culture media at the bedside and incubated without delay. Specimens for viral isolation should be submitted in appropriate viral transport medium (available from Microbiology, CUH).
Comment: Test performed routinely Monday to Friday 9-5pm or by urgent request.
Turnaround: Culture Final: 24-48 hours
Report: Culture for ß-haemolytic streptococci, other bacteria (if appropriate), or yeasts.

Thrombophilia Screen

Laboratory: Haematology
Specimen: Three Blood 3mL, blue Vacuette® (sodium citrate 3.2%) and,
One Blood 4mL red Vacuette (clotted specimen),
One Blood 3mL purple Vacuette (EDTA specimen). Due to potential contamination of genetic material a separate EDTA sample is required.

Samples must be received within 4 hours.
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling.

Note: BCSH guidelines on Thrombophilia testing must be adhered to.
Thrombosis occurs when activation of blood coagulation overwhelms the ability of the natural anticoagulant mechanism and fibrinolytic system to prevent thrombus formation taking place. Thrombophilia screen consists of: INR, APTT, FIB, Actin FSL, DVV test, Antithrombin 3, Protein C, Activated Protein C Resistance and Protein S assays. Anti-Cardiolipin is also included as part of the screen (which includes the Beta 2-Glycoprotein 1 assay when appropriate) if a clotted sample is received. Requests must conform with BCSH guidelines. **Samples without Clinical details WILL NOT be processed.**

**Turnaround:** 3 – 4 weeks
**Ref. Range:** Refer to individual assays

### Thyroglobulin & Thyroglobulin Antibodies

- **Laboratory:** Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
- **Specimen:** 4.0 mL blood in Li Hep or plain tube (clotted sample)
- **Comment:** On patients with diagnosed thyroid cancer only. Consultant request only.
- **Turnaround:** 3 weeks
- **Ref. Range:** See report form, or visit internet site [https://www.eurofins.ie/biomnis/](https://www.eurofins.ie/biomnis/) for up to date referral test information

### Thyroid Antibodies (Anti-Thyroid Peroxidase Abs/ Anti-TPO Abs)

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in a plain tube (clotted sample)
- **Turnaround:** 4 days
- **Ref. Range:** 0 – 5.6 IU/mL

### Thyroid Stimulating Hormone (TSH)

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Turnaround:** 4 days
- **Ref. Range:** 0.35 – 4.94 mU/L

### Tissue / Biopsy

- **Laboratory:** Microbiology (Main laboratory)
- **Specimen:** Tissue specimens for Microbiology must not be placed in formalin. The specimen should be collected into a clean, sterile, leakproof container. For small specimens, add several drops of sterile saline to keep moist (include on label the nature of any additives e.g. 10mL saline). Do not allow tissue to dry out. Bone marrow aspirates should be inoculated directly into a blood culture bottle as per the Blood Culture guidelines. Transport specimens ASAP. If processing is delayed, refrigeration is preferable to storage at ambient temperature. It is vital that the specimen container is properly labelled.
- **Comment:** Test performed routinely Monday to Friday 9-5pm or by urgent request. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. The recovery of anaerobes is compromised if the transport time exceeds 3 hours. If a fungal infection is suspected, please include as much information as possible regarding patient medical history, travel history and occupation.
- **Turnaround:** Culture: Prelim: 24 hours; Final: 48-72 hours
- **Report:** Culture report: Any clinically significant isolate with the appropriate sensitivities.

### Tobramycin

Refer to Antibiotic Assays
TORCH

See Intra-Uterine Infection Screen

**Toxicology / Drug Screen: Blood**

- **Laboratory:** Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
- **Specimen:** 4.0 mL blood in a plain tube (clotted sample)
- **Comment:** Tested for Benzodiazepines, Barbiturates, Alcohol, Tricyclics, Paracetamol and Salicylate
- **Turnaround:** 1 week
- **Ref. Range:** See report form or contact Beaumont Toxicology Dept. Tel (01) 8092673 / (01) 8092675, Emergency after hours (087) 2590749, Fax (01) 8093986.

**Toxicology / Drug Screen: Urine**

- **Laboratory:** Sample referred from Clinical Biochemistry to Toxicology Laboratory BEAUMONT Hospital Dublin, posted Monday, Tuesday, Wednesday and Thursday.
- **Specimen:** Spot urine
- **Comment:** Tested for Benzodiazepines, Barbiturates, Opiates, Cocaine, Propoxyphene, Cannabis, Amphetamine, Methadone, Phencyclidine, Alcohol
- **Turnaround:** 1 week
- **Ref. Range:** See report form or contact Beaumont Toxicology Dept. Tel (01) 8092673 / (01) 8092675, Emergency after hours (087) 2590749, Fax (01) 8093986.

**Toxocara Antibodies**

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

**Toxoplasma gondii IgG Antibody**

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

**Toxoplasma gondii IgM Antibody**

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood
- **Turnaround:** Negative samples: 36 hours
  Positive Toxoplasma IgM must be confirmed by a reference laboratory – at least 3 weeks
- **Report:** Positive or negative

**TPMT Phenotyping**

- **Laboratory:** Sample referred from Clinical Biochemistry to Dr Loretta Ford, Clinical Chemistry Dept., City Hospital, Dudley Road, Birmingham, West Midlands, B18 7QH Tel 004421 5074271
- **Specimen:** 5 – 10 mL EDTA whole blood
- **Turnaround:** 2 weeks
- **Ref. Range** Contact laboratory
### Transferrin

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Turnaround:** 4 Days
- **Ref. Range:** 1.8 – 3.2 g/L

### % Transferrin Saturation

- **Laboratory:** Clinical Biochemistry
- **Specimen:** Not applicable
- **Comment:** Calculated from the Iron and Transferrin results.
- **Turnaround:** 4 Days
- **Ref. Range:** Contact biochemistry

### Trichinella Antibodies

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

### Trichomonas vaginalis

- **Laboratory:** Microbiology (Main laboratory)
- **Specimen:** Testing for *Trichomonas vaginalis* will not be performed unless a labelled slide is sent accompanying the swab.
  - *For Trichomonas*, the posterior fornix should be swabbed. The slide should then be placed in a slide holder.
- **Comment:** This examination must be specifically requested.
- **Turnaround:** 24 hours.
- **Report:** Trichomonas vaginalis seen or not seen

### Tricyclics

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

### Triglycerides

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Comment:** Fasting sample required
- **Turnaround:** A/E or urgent sample: - 1 hour 15 mins approx. CUH wards, CUMH, SI, SF, SMOH, MGH: - 3 hours approx.
  - GP or OPD results posted within 4 days.
- **Ref. Range:** 0.3 – 1.7 mmol/L

### Troponin I – High Sensitive

- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Turnaround:** 1 hour 15 mins
Ref. Range: The 99th. Centile is = <34ng/L (male)
                 is = <16ng/L (female)

Optimally for the biochemical diagnosis of MI it is recommended that two
samples are taken for Troponin I (hs) measurement; the first at presentation
and the second 3 to 6 hours later.

In a patient with evidence of ischaemia:
AMI is likely if, at least one result is > 34 ng /L (for males) or >16ng/L (for
females) and Troponin I (hs) values change by 50% or more between the
two samples.

Trypanosoma cruzi Antibodies

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

Tryptase (Mast Cell)

Laboratory: Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories
Specimen: 4.0 mL blood in Li Hep or plain tube (clotted sample)
Comment: Draw blood as soon as possible after anaphylactic shock, again at 2 hours
and 8 hours after.
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site https://www.eurofins.ie/biomnis/ for up to
date referral test information

Ttg (tissue Trans Glutaminase antibodies)

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Quantitative Immunoassay using Phadia Immunocap 250 analyser. Part of
Coeliac screen. Anti EMA undertaken automatically on all positive sera to
confirm.
Turnaround: 24 Hours
Ref. Range: 0  -  2.5 AU/ML

Tuberculosis Testing

Refer to Mycobacteriology

Tubule Antibodies

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

U1RNP

Laboratory: Autoimmune Serology
Specimen: Blood, 4 mL red top Vacuette (or similar container for clotted blood)
Comment: Qualitative Elisa. Automatically undertaken on all Anti-ENA positive sera.
Turnaround: 72 Hours
Ref. Range: Not applicable

Ulcer Swab

See Wound Swab

Urate (Blood)

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

Laboratory: Clinical Biochemistry
Specimen: 24 Hour collection
Turnaround: 1 Day
Ref. Range: 1500 – 4500 µmol/24 Hr

Urea (Blood)

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

Urea (Urinary)

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

Urethral Swab

Refer to Genital swab

Urinary Legionella Antigen

Laboratory: Microbiology (Infectious Diseases Serology)
Specimen: Urine
Comment: Test performed only by special arrangement with Microbiology Consultant.
Turnaround: 36 hours
Report: Positive or negative

Urinary Schistosomiasis

See Schistosoma haematobium

Urinary Streptococcus pneumoniae Antigen

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

Urine Microscopy and Culture

Laboratory: Microbiology (Main laboratory)
Specimen: Ideally, a minimum of 1mL is required for routine culture. The specimen should be collected into a clean, sterile, leakproof container. For samples which may be delayed in delivery to the laboratory (>24hrs) a sample container containing boric acid (preservative) should be used, fill to the line marked.
Note: A minimum of 5mL is essential for boric acid samples, where smaller volumes are collected, do not use a boric acid container. Excessive fluid intake will dilute the urine and may decrease the colony count to <10^5 CFU/mL.
Separate specimens must be collected for detection of Mycobacteria or S. haematobium (see same). A fresh specimen is essential for the investigation of casts.

Specimen Types
Midstream urine (MSU) Recommended for routine use. The first part of voided urine is discarded and without interrupting the flow, approximately 10mL is collected into a sterile
container. The remaining urine is discarded.
Bag specimen urine (BSU). Used commonly for infants and young children. The sterile bags are taped over the genitalia and the collected urine is transferred to a sterile leakproof container. There are frequent problems of contamination with this method of collection.
Clean catch urine (CCU). Thorough periurethral cleaning is recommended. The whole specimen is collected into a sterile container and then an aliquot sent for examination.
Suprapubic aspirate (SPA). The use of this invasive procedure is usually reserved for clarification of equivocal results from voided urine e.g. in infants.
Catheter urine (CSU). May be obtained from suprapubic or per urethral catheters. The specimen should not be obtained from the collection bag.
Ileal conduit-urostomy urine is collected via a catheter passed aseptically into the stomal opening after removal of the external appliance. Results from this type may be difficult to interpret and should be performed only if there is an indication for treatment, such as pyrexia or constitutional upset.
Cystoscopy urine is obtained directly from the bladder using a cystoscope.

**Comment:** It is important that there should be minimal delay before culture. If processing is delayed >6 hours, refrigeration for up to 48 hours and use of boric acid containers is recommended. Ensure containers are filled to the line (20mL).

**Turnaround:**
- Microscopy: Routine: 24 hours. Urgent: 2 hours of receipt.
- Culture: Preliminary: 24 hours. Final: 24-72 hours

**Report:**
- Microscopy: Report on the range of WBCs and RBCs per cmm as well as the presence of epithelial cells, casts, bacteria, yeasts and *Trichomonas* spp. if present.
- Culture: Report bacterial growth in orgs/mL with sensitivities and comment where appropriate. Culture will only be carried out where WCC is >20/cmm, but the following are cultured in all cases; Antenatal, <16 year, Renal, ICU, potentially immunocompromised.

**Valproate**
- **Laboratory:** Clinical Biochemistry
- **Specimen:** 4.0 mL blood in plain tube (clotted sample)
- **Comment:** Chronic oral dosing: trough sample immediately before next dose
- **Turnaround:** 1 Day
- **Ref. Range:** 50-100 mg/L Range is appropriate for a trough sample.

**Vancomycin**
- **Refer to Antibiotic Assays**

**Vancomycin Resistant Enterococci (VRE)**
- **Laboratory:** Microbiology (Main laboratory)
- **Specimen:** Rectal swabs, placed in charcoal containing transport media.
- **Comment:** Test performed Monday to Friday 9-5pm. Label all Microbiology forms with VRE SCREEN. Indicate if the patient was previously VRE positive. Transport specimens ASAP. If processing of swabs is delayed, refrigeration is preferable to storage at ambient temperature.
- **Turnaround:** Prelim: 24 hours; Final: 48-72 hours
- **Report:** “VRE not isolated”, *Enterococcus* species isolated with the following comment: This is a Vancomycin resistant Enterococcus

**Varicella-zoster Virus IgG Antibody**
- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood
- **Comment:** VZV IgG testing is performed on all antenatal patients
- **Turnaround:** 36 hours
<table>
<thead>
<tr>
<th>Test</th>
<th>Laboratory</th>
<th>Specimen</th>
<th>Comment</th>
<th>Turnaround</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varicella-zoster Virus IgM Antibody</td>
<td>Microbiology (Infectious Diseases Serology)</td>
<td>4mL clotted blood</td>
<td>Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)</td>
<td>5 working days</td>
<td>Positive or negative</td>
</tr>
<tr>
<td>Varicella-zoster Virus Molecular</td>
<td>Microbiology (Infectious Diseases Serology)</td>
<td>CSF (1mL), viral swab (skin, eye), vesicle fluid</td>
<td>Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)</td>
<td>5 working days</td>
<td>Positive or negative</td>
</tr>
<tr>
<td>Vasculitic Screen</td>
<td>Autoimmune Serology</td>
<td>Blood, 4mL red top Vacuette (or similar container for clotted blood)</td>
<td>Includes Auto Antibody Screen + Anti Neutrophil Cytoplasmic Antibody assay.</td>
<td>48 Hours or stat by contacting laboratory.</td>
<td>Detected or not detected</td>
</tr>
<tr>
<td>Very Long Chain Fatty acids</td>
<td>Sample referred from Clinical Biochemistry to Willink Institute, Manchester.</td>
<td>4.0 mL blood in EDTA or Lithium Heparin</td>
<td>3 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vincent’s Angina</td>
<td>See Mouth Swab</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viral Screen (Eye)</td>
<td>Microbiology (Infectious Diseases Serology)</td>
<td>Viral swab</td>
<td>Adenovirus, Herpes Simplex Virus 1/2, Varicella-zoster Virus. Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin).</td>
<td>5 working days</td>
<td>Detected or not detected</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Viscosity testing is referred from Clinical Biochemistry (Immunology section) to St. James’ Hospital, Dublin</td>
<td>2 samples in EDTA bottles.</td>
<td>Viscosity &gt;2.9 associated with Hyperviscosity Syndrome</td>
<td>3 Days</td>
<td></td>
</tr>
<tr>
<td>Vitamin A (Retinol)</td>
<td>Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London.</td>
<td>4.0 mL blood in a plain tube (clotted sample)</td>
<td>Consultant request only. Protect from light.</td>
<td>3 weeks</td>
<td>See report form, or visit internet site <a href="http://www.nutristasis.com">www.nutristasis.com</a> for up to date referral test information</td>
</tr>
</tbody>
</table>
## Vitamin B12

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Haematology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Blood 4mL red Vacuette (clotted specimen).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Test available Monday to Friday, during routine working hours. Vitamin B12 is a coenzyme necessary to the biosynthesis of DNA and RNA. Deficiency in man is associated with megaloblastic anaemia it is also vital to the normal metabolism of folic acid. It is of particular importance to recognise vitamin B12 deficiency as it causes both neurologic and psychiatric damage, which is preventable when diagnosed at an early stage. Values between 120 and 135 ng/l are considered indeterminate and should be interpreted in conjunction with full blood count results (including macrocytosis and clinical parameters). B12 and Folate should be requested for investigation of abnormal FBC results and relevant clinical syndromes. Use of haematinics for screening of well patients is not recommended. Requests should be accompanied by clinical details. See BCSH guidelines. The diagnosis of B12 and folate deficiency</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>7 working days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>120 – 650 ng/l</td>
</tr>
<tr>
<td></td>
<td>120 – 135 ng/l indeterminate</td>
</tr>
</tbody>
</table>

#### 1, 25 Dihydroxy Vitamin D (Calcitrol)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Clinical Biochemistry to Eurofins-Biomnis Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>Ml blood in a plain tube (clotted sample) on ice, must be frozen &lt; 1 hr. (minimum 2.0 mL serum required)</td>
</tr>
<tr>
<td>Comment:</td>
<td>Consultant request only.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See report form, or visit internet site <a href="https://www.eurofins.ie/biomnis/">https://www.eurofins.ie/biomnis/</a> for up to date referral test information.</td>
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#### Vitamin D (25Hydroxy Vitamin D) / Hydroxycholecalciferol

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Clinical Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in a plain tube (clotted sample).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Appropriate clinical details essential</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>10 days</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>&lt;25 nmol/L: Deficient</td>
</tr>
<tr>
<td></td>
<td>20-50 nmol/L: Insufficient</td>
</tr>
<tr>
<td></td>
<td>50-75 nmol/L: Adequate</td>
</tr>
<tr>
<td></td>
<td>&gt;75 nmol/L: Optimal</td>
</tr>
<tr>
<td></td>
<td>&gt;125 nmol/L: Risk of Excess</td>
</tr>
</tbody>
</table>

#### Vitamin E (Tocopherol)

<table>
<thead>
<tr>
<th>Laboratory:</th>
<th>Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen:</td>
<td>4.0 mL blood in a plain tube (clotted sample).</td>
</tr>
<tr>
<td>Comment:</td>
<td>Sample must be separated &lt; 1 hour.</td>
</tr>
<tr>
<td>Turnaround:</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Ref. Range:</td>
<td>See report form, or visit internet site <a href="http://www.nutristasis.com">www.nutristasis.com</a> for up to date referral test information</td>
</tr>
</tbody>
</table>
Vitamin K (Phytonadione)

Laboratory: Sample referred from Clinical Biochemistry to Nutristasis Unit, St. Thomas Hospital, London
Specimen: 4.0 mL blood in a plain tube (clotted sample) on ice, must be separated and frozen within 1 hour
Comment: Protect from light. Consultant request only.
Turnaround: 3 weeks
Ref. Range: See report form, or visit internet site www.nutristasis.com for up to date referral test information

Von-Willebrand Multimers / Collagen binding

Laboratory: Referred from Haematology Dept. National Coagulation Laboratory, Centre for Clinical Pathology and Laboratory Medicine (CPLM), St James Hospital, Dublin 8
Specimen: Blood 3mL; blue Vacuette® (sodium citrate 3.2%) x 3
Comment: This is part of the Von Willebrand Screen which includes VW:Ag, VW:RCo, and Factor VIII. Multimers are only analysed in specific circumstances or on request by Coagulation Consultant.
Turnaround: 42 days / 64 days
Ref. Range: Qualitative result

Von Willebrand Screen: Ristocetin Co-factor vWF Activity, Von-Willebrand Factor Antigen and Factor VIII

Laboratory: Haematology
Specimen: Blood 3mL x 3, blue Vacuette® (sodium citrate 3.2%)
Specimens that are haemolysed, underfilled or overfilled cannot be analysed, check coagulation sample bottles are not expired to ensure correct filling).
Comment: Test available Monday to Friday, during routine working hours. Screen includes Factor V111 assay, vWF:ag (vW factor Ag), vWFActor Activity (Ristocetin Co-Factor)
Samples must be received within 4 hours
Turnaround: 3 – 4 weeks
Ref. Range: vWF activity: 0.55 – 1.56 IU/mL
vWF Ag level: 0.50 – 1.60 IU/mL
Factor VIII Adult 0.50 – 1.49 IU/mL

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

Laboratory: Sample is referred from Haematology to Molecular Genetics Laboratory, University College London
Specimen: Blood 3mL blue Vacuette® (sodium citrate 3.2%) fill tube to mark.
Comment: Request must be booked in advance with the Haematology Laboratory CUH. Requested by Consultant Haematologist for further investigation of von Willebrand Disease. ADAMTS13 Assay Request form must be completed, must be sent on dry ice and samples can only be referred Monday or Tuesday (via Eurofins-Biomnis).
Turnaround: 60 days
Ref. Range: See report or contact University College London, 1st Floor Chenies Mews.

Warfarin Plasma Resistance Concentration and gene

Laboratory: Sample is referred from Haematology to The Centre for Haemostasis and Thrombosis, 1st Floor North Wing, St Thomas’ Hospital
Specimen: 2 x EDTA and 2 x Citrate, needs to be booked with the laboratory prior to sampling.
Comment: Requested by Coagulation Consultant
Super Warfarin (rodenticides) Vitamin K1 and PIVKA 11 are part of this profile reported and may be requested
West Nile Virus Antibodies

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

Whipples Disease

**Laboratory:** Microbiology (Infectious Diseases Serology)
**Specimen:** 4mL EDTA blood, CSF
**Comment:** PCR test performed by a reference laboratory (Department of Microbiology, Leeds General Infirmary)
**Turnaround:** 14 days
**Report:** Positive or negative

Whooping Cough
See **Bordetella** Species – Culture

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

Wound Swab (Skin / Abscess / Decubitus ulcer / Bite / Burn swab)

**Laboratory:** Microbiology (Main laboratory)
**Specimen:** Always list site and type of wound on request form. Specimens of pus, if present, are preferred to swabs. Pus/fluids up to a volume of 20mL should be supplied (ideally a minimum of 1mL). Swabs should be soaked in exudate where possible. Specimen a representative part of the lesion. Specimen the deepest part of the wound, avoiding the superficial microflora.
**Comment:** The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. Specimens should be transported to the laboratory within 3 hours after which the recovery of anaerobes is compromised. Results from delayed specimens must be interpreted with caution bearing in mind the difficulties in isolating anaerobes from these specimens. Routine processing of superficial swabs of ulcers should be discouraged. Swabbing dry crusted areas is unlikely to be helpful. If specimens are taken from ulcers the debris on the ulcer should be removed, the ulcer cleaned with saline and either a biopsy, or preferably a needle aspiration of the edge of the wound taken. A less invasive irrigation-aspiration method may be preferred. Using a small needle-less syringe, place the syringe tip under the ulcer margin and irrigate gently with at least 1mL sterile saline without preservative. After massage of the ulcer margin, repeat the irrigation with a further 1mL sterile saline. Massage the ulcer margin again, aspirate approximately 0.25mL of the fluid and place in a sterile, leakproof container.
**Turnaround:** Urgent microscopy (pus / fluid): Within 2 hours of receipt. Culture: Preliminary report: 24 hours; Final report: 24-72 hours
**Report:** Microscopy: Report on the numbers of WBCs/cmm and the presence of organisms if present.
Culture: “No growth” or “skin flora” or report any clinically significant organism isolated with sensitivities.

**Yersinia Antibodies**

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

**Zika Virus**

- **Laboratory:** Microbiology (Infectious Diseases Serology)
- **Specimen:** 4mL clotted blood (Serology), 4mL EDTA blood (Molecular)
- **Comment:** Performed by a reference laboratory (National Virus Reference Laboratory (NVRL), Dublin)
- **Turnaround:** 10 days
- **Report:** Positive or Negative (Serology), Detected or Not Detected (Molecular)

**Zinc**

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

The abbreviations used in this handbook include names of tests are in accordance with current use and accepted recommendations.

ACE  Angiotensin converting enzyme
ACTH  Adrenocorticotrophic hormone
ADH  Antidiuretic hormone
AFB  Acid fast bacilli
AFP  Alpha- Fetoprotein
ALT  Alanine aminotransferase
ALP  Alkaline phosphatase
ANCA  Antineutrophil 175riiodothy antibody
ANF  Antinuclear Factor
APC  Activated protein C
APTT  Activated partial Thromboplastin time
ASOT  Antistreptolysin O titre
AST  Aspartate aminotransferase
BJP  Bence Jones Protein
C3  Third component of complement
C4  Fourth component of complement
CA  Carbohydrate antigen (tumour markers)
CEA  Carcinoembryonic antigen
CK  Creatine kinase
CMV  Cytomegalovirus
CPE  Carbapenemase Producing Enterbacteriales
CRP  C-reactive protein
CSF  Cerebrospinal fluid
DDI  D-Dimers
DHEA  Dehydroepiandrosterone
DHEAS  Dehydroepiandrosterone sulphate
DVVT  Dilute Viper Venom test
EBV  Epstein Barr virus
EDTA  Ethylene diamine tetra-acetic acid
EGFR  Epidermal Growth Factor Receptor
EMA  Endomyocytic Antibodies
ENA  Extractable Nuclear Antigens
EPO  Erythropoietin
ESR  Erythrocyte sedimentation rate
FISH  Flourescence In Situ Hybridisation
FBC  Full blood count, full blood examination, complete blood count
FNAB  Fine needle aspiration biopsy
FSH  Follicle stimulating hormone
FT3  Free Triiodothyronine (T3)
FT4  Free thyroxine (T4)
GBM(Q)  Glomerular Basement Membrane Antibodies (Quick test)
GC  Gonococci
GGT  Gamma glutamyl transferase (transpeptidase)
GTT  Glucose tolerance test
HAV  Hepatitis A virus
Hb  Haemoglobin
HbA1c  Glycated haemoglobin
HbA2  Haemoglobin A2
HbF  Haemoglobin F, fetal haemoglobin
HbS  Sickle haemoglobin, haemoglobin S
HbsAg  Hepatitis B surface antigen
HBV  Hepatitis B virus
hCG  Human chorionic gonadotrophin
HCO₃  Bicarbonate
HCT  Haematocrit, packed cell volume
HCV  Hepatitis C virus
HDL  High density lipoprotein
HDNB  Haemolytic Disease of the Newborn
hGH  Human growth hormone
HIAA  5-Hydroxyindole acetate
HLA  Human leucocyte antigen
HMMA  4-hydroxy-3-methoxymandelate
HPV  Human papillomavirus
HSV  Herpes simplex virus
HVA  Homovanillate
HVS  High Vaginal Swab
HZV  Herpes zoster virus (varicella zoster)
ICCS  Intercellular cement substance
Ig  Immunoglobulin
IGF  Insulin-like growth factor
INR  International normalised ratio
IUCD  Intrauterine Contraceptive Device
kg  Kilogram
kPa  Kilopascal
KRAS  KRAS gene
LD  Lactate dehydrogenase
LDL  Low density lipoprotein
LGV  Lymphogranuloma venereum
LH  Luteinising hormone
MCH  Mean cell haemoglobin
MCHC  Mean cell haemoglobin concentration
MCV  Mean cell volume
MGUS  Monoclonal gammopathy of unknown significance
MMR  Measles, Mumps, Rubella IgG antibodies
MRSA  Methicillin-Resistant Staph aureus
MSI  Microsatellite Instability
MSU  Midstream Urine
MTHFR  Methyltetrahydrofolate Reductase
PCR  Polymerase chain reaction
pCO₂  Partial pressure of carbon dioxide (CO₂)
PCP  Pneumocystis jirovecii
PCV  Packed cell volume
PIE  Pulmonary infiltration with eosinophilia
PNH  Paroxysmal nocturnal haemoglobinuria
pO₂  Partial pressure of oxygen (O₂)
PR  Prothrombin ratio
PSA  Prostate specific antigen
PT  Prothrombin time
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<tr>
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<td>PTH</td>
<td>Parathyroid hormone</td>
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<tr>
<td>PTHrP</td>
<td>Parathyroid hormone related peptide</td>
</tr>
<tr>
<td>RAST</td>
<td>Radioallergosorbent test- see specific IgE</td>
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<tr>
<td>RCC</td>
<td>Red cell count</td>
</tr>
<tr>
<td>RDW</td>
<td>Red cell distribution width</td>
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<tr>
<td>RFLP</td>
<td>Restriction fragment length polymorphism</td>
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<tr>
<td>RPR</td>
<td>Rapid plasma reagin test</td>
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<td>RSV</td>
<td>Respiratory syncytial virus</td>
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<td>SHBG</td>
<td>Sex hormone binding globulin</td>
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<td>SLE</td>
<td>Systemic lupus erythematosus</td>
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<tr>
<td>SM</td>
<td>Smith Antigen</td>
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<tr>
<td>STI</td>
<td>Sexually transmitted infection</td>
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<tr>
<td>T3</td>
<td>Triiodothyronine</td>
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<tr>
<td>T4</td>
<td>Thyroxine (tetraiodothyronine)</td>
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<tr>
<td>TBG</td>
<td>Thyroxine binding globulin</td>
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<td>TORCH</td>
<td>Toxoplasmosis, rubella cytomegalovirus, herpes</td>
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<tr>
<td>TPHA</td>
<td>Treponema pallidum haemagglutination</td>
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<tr>
<td>TRH</td>
<td>Thyrotropin releasing hormone</td>
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<tr>
<td>TSH</td>
<td>Thyroid stimulating hormone</td>
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<tr>
<td>tTG</td>
<td>Tissue Trans Glutaminase Antibodies</td>
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<tr>
<td>VCA</td>
<td>Viral capsid antigen (EBV)</td>
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<tr>
<td>VIP</td>
<td>Vasoactive intestinal polypeptide</td>
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<tr>
<td>VRE</td>
<td>Vancomycin- Resistant Enterococci</td>
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<tr>
<td>vWF</td>
<td>von Willebrand factor</td>
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<tr>
<td>vWFAG</td>
<td>von Willebrand factor antigen</td>
</tr>
<tr>
<td>WCC</td>
<td>white cell count, leucocyte count</td>
</tr>
<tr>
<td>XDP</td>
<td>Cross linked fibrin degradation products, D-dimer</td>
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</table>
# 15 NAMES AND ADDRESSES OF REFERRAL LABORATORIES

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<tr>
<th>Name</th>
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<tr>
<td>Addenbrookes Hospital</td>
<td>Addenbrookes Hospital Cambridge, Diagnostics Services, Department of Haematology, Hills Raod, Cambridge, CB2 0QQ</td>
<td>Haematology</td>
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<tr>
<td>Alpha One Foundation</td>
<td>RCSI Building, Beaumont Hospital, Dublin 9</td>
<td>Biochemistry</td>
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<tr>
<td>Anaerobe Reference Laboratory</td>
<td>NPHS Microbiology Cardiff University Hospital of Wales Health Park Cardiff CF14 4XW</td>
<td>Clinical Microbiology</td>
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<tr>
<td>Analytical Services International Ltd</td>
<td>St. George's University Of London Cranmer Terrace, London SW17 ORE</td>
<td>Biochemistry</td>
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<tr>
<td>Antimicrobial Reference Laboratory</td>
<td>Department of Medical Microbiology Southmead Hospital Westbury on Trym Bristol BS10 5NB</td>
<td>Clinical Microbiology</td>
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<tr>
<td>Biochemical Genetics Unit</td>
<td>Box 247Addenbrooke’s Hospital Hills Road Cambridge CB2 0QQ</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Biochemistry Department, St. James's Hospital</td>
<td>James's Street, Dublin 8, Ireland</td>
<td>Biochemistry</td>
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<tr>
<td>Biochemistry, Mater Misericordiae University Hospital (MMUH)</td>
<td>Eccles St., Dublin 7</td>
<td>Biochemistry</td>
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<tr>
<td>Eurofins-Biomnis Ireland</td>
<td>Three Rock Road, Sandyford Business Estate, Dublin 18, Ireland</td>
<td>Biochemistry, Haematology</td>
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<tr>
<td>Brucella Reference Unit (BRU)</td>
<td>Liverpool Clinical Laboratories, Royal Liverpool and Broadgreen University Hospitals NHS Trust, Duncan Building, Prescot St., Liverpool L7 8XP, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Cancer Molecular Diagnostics CMD, St. James’s Hospital</td>
<td>Cancer Molecular Diagnostics, CMD, St James Hospital, James’s St., Dublin 8</td>
<td>Haematology</td>
</tr>
<tr>
<td>Cancer Molecular Diagnostics, St. James’s Hospital</td>
<td>Dr Elizabeth Vandenberghe, Cancer Molecular Diagnostics, St. James’s Hospital, Dublin 8</td>
<td>Pathology</td>
</tr>
<tr>
<td>Central Pathology Haematology, St James’s Hospital</td>
<td>St James’s Hospital, James’s St., Dublin 8</td>
<td>Haematology</td>
</tr>
<tr>
<td>Clinical and Molecular Genetics Unit</td>
<td>Institute of Child Health.30 Guildford Street, London United Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Clinical Biochemistry Department</td>
<td>Kings College Hospital Denmark Hill, London SE5 9RS, United Kingdom 020 3299 9000</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Clinical Microbiology Department</td>
<td>Molecular Identification Services Unit (MISU) :Microbiology Services Colindale61 Colindale Avenue London NW9 5HT</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>City Hospital Birmingham</td>
<td>Dr Jonathan Berg / Dr Loretta Ford City Hospital, Dudley Road, Birmingham, B18 7QH, UK</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>City Hospital Birmingham</td>
<td>Sheffield Children’s Hospital, Western Bank, Sheffield S10 2TH</td>
<td>Pathology</td>
</tr>
<tr>
<td>Clinical Chemistry</td>
<td>Pathology Sciences Building Southmead Hospital Westbury-on-Trym Bristol BS10 5NB United Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Cholinesterase Investigation Unit</td>
<td>Department of Cellular Pathology, The Adelaide and Meath Hospital incorp. The National Children’s Hospital, Tallaght,</td>
<td>Pathology</td>
</tr>
<tr>
<td>City Hospital Birmingham</td>
<td>Sheffield Children’s Hospital, Western Bank, Sheffield S10 2TH</td>
<td>Pathology</td>
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<tr>
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<td>Address</td>
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<tr>
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<td>Meath Hospital</td>
<td>Dublin 24</td>
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</tr>
<tr>
<td>Department of Clinical Chemistry and Newborn Screening, Sheffield</td>
<td>Sheffield Children's NHS Trust Western Bank Sheffield S10 2TH, United Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Department of Immunology,North General Hospital</td>
<td>Herries Road, Sheffield S5 7AU</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Department of Microbiology</td>
<td>Old Medical School, Leeds General Infirmary, Thoresby Place, Leeds LS1 3EX, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Department of Pathology, Ninewells Hospital</td>
<td>Department of Pathology, Ninewells Hospital,Dundee,DD1 9SY, Scotland</td>
<td>Pathology</td>
</tr>
<tr>
<td>Dept of Medical Biochemistry</td>
<td>University Hospital of Wales Cardiff CF 14 4XY</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Endocrinology Laboratory</td>
<td>Department of Specialist Laboratory Medicine Block 46 St James Hospital Leeds Gen LS9 7TF</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Freeman Hospital</td>
<td>Freeman Hospital Freeman Road High Heaton Newcastle Upon Tyne NE7 7DNUnited Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Galateau-Salle, Prof Francoise,</td>
<td>Department of Pathologique Route de la DeDelivandre CHU-Cote de Nacre,14033-CAENCEDEX, France</td>
<td>Pathology</td>
</tr>
<tr>
<td>Gastrointestinal Bacteria Reference Unit (GBRU)</td>
<td>Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Genomic Health, Inc.</td>
<td>Genomic Health, Inc.,301 Penobscot Drive, Redwood City, CA 94063,USA</td>
<td>Pathology</td>
</tr>
<tr>
<td>Great Ormond Street Immunology</td>
<td>Great Ormond Street Immunology, Immunology Department, Molecular Genetics, Level 4, Camelia Botnar Laboratories Great Ormond Street Hospital, Great Ormond Street, WC1N 3JH</td>
<td>Haematology</td>
</tr>
<tr>
<td>Viapath, GSTS Pathology</td>
<td>Viapath, GSTS Pathology Centre, The Human Nutristasis Unit, The Centre for Haemostasis and Thrombosis, 1st Floor North Wing, St Thomas’ Hospital, Westminster Bridge Road , London SE1 7EH UK</td>
<td>Haematology</td>
</tr>
<tr>
<td>GSTS Pathology Kingspath Hospital, King’s College Hospital NHS Foundation Trust</td>
<td>Mr Christopher Lambert, The Red Cell Centre, King’s College Hospital, London,  SE5 9RS Westminster Bridge Rd., London</td>
<td>Haematology</td>
</tr>
<tr>
<td>Haematology, Coombe Hospital Dublin</td>
<td>Coombe Women and Infants University Hospital, Cork St., Dublin 8</td>
<td>Haematology</td>
</tr>
<tr>
<td>Haematology, Our Lady’s Hospital Crumlin</td>
<td>Our Lady’s Children’s Hospital, Division of Cytogenetics (Oncology), Crumlin, Dublin 12, Ireland</td>
<td>Haematology</td>
</tr>
<tr>
<td>Haematology Dept, St. James hospital</td>
<td>Haematology Dept , St. James hospital , Dublin 8</td>
<td>Haematology</td>
</tr>
<tr>
<td>Harefield Hospital</td>
<td>Mr Neil Leaver Principal Clinical Scientist, Harefield Hospital,Harefield 90 UB United Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>HPA Laboratory</td>
<td>P.O. Box 209Manchester Medical Microbiology Partnership Clinical Sciences Building Manchester Royal Infirmary Oxford Road</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Immunology Department and Protein Reference Unit</td>
<td>P.O Box 894 Sheffield S5 7YUnited Kingdom</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Dept of Neuropathology</td>
<td>3rd Fir Pathology, Lab Med Building, Southern General Hospital, 1345 Govan Rd, Glasgow G51 4TF, UK.</td>
<td>Pathology</td>
</tr>
<tr>
<td>Name</td>
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<td>---------</td>
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</tr>
<tr>
<td>Irish Meningitis &amp; Sepsis Reference Laboratory (IMSRL)</td>
<td>The Children's University Hospital, Temple St, Dublin 1, Ireland</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Irish Mycobacterial Reference Laboratory</td>
<td>Clinical Microbiology, St. James’s Hospital, James's Street, Dublin 8</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>King’s Healthcare Trust</td>
<td>Dr Raja, Trace Element Unit Dept. of Clinical Biochemistry King’s Healthcare Trust Denmark Hill London, SE5 9RE England</td>
<td>Pathology</td>
</tr>
<tr>
<td>Malaria Reference Laboratory</td>
<td>PHE Malaria Reference Laboratory, Faculty of Infectious &amp; Tropical Diseases, London School of Hygiene &amp; Tropical Medicine, Keppel Street, LONDON, WC1E 7HT</td>
<td>Haematology</td>
</tr>
<tr>
<td>Metabolic Investigation Laboratory, Children’s University Hospital</td>
<td>Temple St., Dublin 1</td>
<td>Biochemistry</td>
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<tr>
<td>Microbiology Dept. University Hospital Waterford</td>
<td>University Hospital Waterford, Dunmore Road, Waterford</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Micropathology Ltd</td>
<td>University of Warwick Science Park, Venture Centre, Sir William Lyons Road Coventry CV4 7EZ</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Mitochondrial NCG Diagnostic Service</td>
<td>The Medical School, Newcastle University, Framlington Place, Newcastle upon Tyne NE2 4HH, UK</td>
<td>Pathology</td>
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<tr>
<td>Molecular Histopathology Laboratory, Beaumont Hospital</td>
<td>Molecular Histopathology Laboratory, Department of Pathology, R.C.S.I. Education &amp; Research Centre, Beaumont Hospital, Dublin 9</td>
<td>Pathology</td>
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<tr>
<td>Molecular Pathology</td>
<td>Level 6, Clinical Sciences Building, St James’s University Hospital, Beckett Street, Leeds LS9 7TF, England</td>
<td>Clinical Microbiology</td>
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<tr>
<td>MRSA National Reference Laboratory</td>
<td>St. James’s Hospital, James’s Street, Dublin 8.</td>
<td>Clinical Microbiology</td>
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<tr>
<td>Mycology Reference Centre</td>
<td>Old Medical School, Leeds General Infirmary, Thoresby Place, Leeds LS1 3EX, England</td>
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<tr>
<td>National Amyloidosis Centre</td>
<td>Royal Free Hospital Rowland Hill Street London, NW3 2PF</td>
<td>Biochemistry</td>
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<tr>
<td>National Centre for Medical Genetics</td>
<td>National Centre for Medical Genetics Our Lady’s Children’s Hospital Crumlin Dublin 12, Ireland</td>
<td>Biochemistry</td>
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<td>National Centre for Medical Genetics</td>
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<td>Haematology</td>
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<td>National Centre for Medical Genetics (NCMG)</td>
<td>Our Lady’s Hospital for Sick Children, Crumlin, Dublin 12, Ireland</td>
<td>Biochemistry</td>
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<tr>
<td>National Coagulation Laboratory</td>
<td>National Coagulation Laboratory, Centre for Clinical Pathology and Laboratory Medicine, (CPLM), St James Hospital, Dublin 8</td>
<td>Haematology</td>
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<tr>
<td>National Carbapenemase Producing Enterobacteriales Reference Laboratory</td>
<td>Carbapenemase Producing Enterobacteriales (CPE) Reference Laboratory, Department of Medical Microbiology, University Hospital Galway, Galway</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Haemostasis Molecular Diagnostics (HMD)</td>
<td>Haematology Dept. to Haemostasis Molecular Diagnostics (HMD), National Coagulation Laboratory, Centre for Clinical and Laboratory Medicine, CPLM, St James Hospital, Dublin 8</td>
<td>Haematology</td>
</tr>
<tr>
<td>National Mycobacterium Reference Laboratory</td>
<td>Abernethy Building Institute of Cell and Molecular Science (ICMS)2 Newark Street London E1 2AT</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>National Salmonella, Shigella &amp; Listeria Reference</td>
<td>Department of Medical Microbiology, University Hospital Galway, Galway</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Name</td>
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<td>National Virus Reference Laboratory (NVRL)</td>
<td>University College Dublin, Belfield, Dublin 4, Ireland</td>
<td>Clinical Microbiology</td>
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<tr>
<td>Neuroimmunology Dept</td>
<td>National Hospital for Neural and Neurosurgery, Queen Square, London WC1N 3BG</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>NHSBT Centre Bristol</td>
<td>NHSBT Centre, 500 North Brighton Park Northway, Filton, Bristol, BS34 7QH, UK</td>
<td>Haematology</td>
</tr>
<tr>
<td>North Bristol NHS Trust</td>
<td>Dept. of Clinical Biochemistry, Pathology Sciences, Southmead Hospital, Westbury on Trym, Bristol, BS10 5NB</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Nutristasis Unit</td>
<td>Haemostasis and Thrombosis GSTS Pathology 4th floor, North Wing St Thomas' Hospital Westminster Bridge Road, London SE1 7EH</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>National Haemoglobin Reference Laboratory</td>
<td>Dr. John Old, National Haemoglobinopathy Reference Laboratory, Molecular Haematology, Level 4, John Radcliffe Hospital, Oxford OX3 9DU, United Kingdom</td>
<td>Haematology</td>
</tr>
<tr>
<td>Oxford University Hospitals NHS JR320</td>
<td>NHS Hospital: P11174259 Oxford Pathology Laboratory MH Research</td>
<td>Haematology</td>
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<tr>
<td>PHE National Parasitology Reference Laboratory (NPRL)</td>
<td>Department of Clinical Parasitology, Hospital for Tropical Diseases, Mortimer Market, Capper Street, London WC1E 6JB, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>PHE South West Laboratory</td>
<td>North Bristol NHS Trust, Pathology Sciences Building, Science Quarter, Southmead Hospital, Bristol, BS10 5NB, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Primary Ciliary Dyskinesia (PCD) Diagnostic Service, University Hospital Southampton</td>
<td>Patricia Goggin PCD EM Scientist Biomedical imaging Unit Mail point 12 South Academic Block Southampton General Hospital UK SO166YD</td>
<td>Pathology</td>
</tr>
<tr>
<td>Public Health Laboratory, Cherry Orchard Hospital</td>
<td>PHL Cherry Orchard Hospital, Ballyfermot, Dublin 10</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Purine Research Laboratory</td>
<td>Dr Lynette Fairbanks, 4th Floor, North Wing, St. Thomas's Hospital, London SE1 7EH</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Rare and Imported Pathogens Laboratory (RIPL)</td>
<td>Public Health England, Porton Down, Salisbury, Wiltshire SP4 OJG, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPRU)</td>
<td>Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England</td>
<td>Clinical Microbiology, Biochemistry</td>
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<tr>
<td>Rotunda Hospital</td>
<td>Rotunda Hospital , Parnell Street, Dublin 1, D01 P5W9</td>
<td>Haematology</td>
</tr>
<tr>
<td>Royal Marsden Hospital NHS Foundation TR</td>
<td>RMH HMD, The Centre for Molecular Pathology, The Royal Marsden NHS Foundation Trust, Cotswold Road, Sutton, Surrey, SM2 5NG</td>
<td>Haematology</td>
</tr>
<tr>
<td>SAS Centre</td>
<td>c/o Ground Floor Oncology Charing Cross Hospital Fulham Palace RoadLONDON NW6 8RF</td>
<td>Biochemistry</td>
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<tr>
<td>SAS Peptide Hormones, Royal Surrey County Hospital</td>
<td>Clinical Laboratory, Royal Surrey County Hospital, Egerton Road, GUILDFORDGU2 5XX</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>SAS Trace Element Unit</td>
<td>Division of Laboratory Medicine Southampton University Hospitals NHS Trust Mail Point 804 Southampton General Hospital Tremona Road SOUTHAMPTONSO16 6YD</td>
<td>Biochemistry</td>
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<tr>
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<tr>
<td>Sexually Transmitted Bacteria Reference Laboratory (STBRL)</td>
<td>Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>TDL Genetic Referrals</td>
<td>The Doctor's Laboratory Genetics, 60 Whitfield Street, London W1T 4EU</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>The Antimicrobial Resistance and Healthcare Associated Infections Reference Unit (AMRHAI)</td>
<td>Bacteriology Reference Department, PHE Microbiology Services, 61 Colindale Avenue, London NW9 5EQ</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>The Doctors Laboratory Ltd</td>
<td>60 Whitfield Street, London, W1T 4EU, UK</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>The National Creutzfeldt-Jakob Disease Research &amp; Surveillance Unit</td>
<td>Room FU 529, First Floor, Chancellor's Building, 49 Little France Crescent, Edinburgh EH16 4SB, UK</td>
<td>Pathology</td>
</tr>
<tr>
<td>Toxicology Laboratory, Beaumont Hospital</td>
<td>Beaumont, Dublin 9</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Toxoplasma Reference Laboratory (TRL)</td>
<td>Singleton Hospital, Swansea SA2 8QA, Wales</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Trace Element Laboratory</td>
<td>Centre of Clinical Science &amp; Measurement, School of Biological Sciences, University of Surrey, Guildford GU2 S5XEndocrine Laboratory</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>University College London UCL</td>
<td>University College London, Molecular Genetics Laboratory, University College London, Hospital, NHS Foundation Trust, 307 Ellston Road, London NW1 3AD</td>
<td>Haematology</td>
</tr>
<tr>
<td>Virology Reference Department</td>
<td>PHE Microbiology Services, 61 Colindale Avenue, London NW9 5HT, England</td>
<td>Clinical Microbiology</td>
</tr>
<tr>
<td>Weatherall Institute of Molecular Medicine</td>
<td>Weatherall, MRC Molecular Haematology Unit, John Radcliffe Hospital, Headington, Oxford</td>
<td>Haematology</td>
</tr>
<tr>
<td>Wellchild Laboratory</td>
<td>Wellchild Research Laboratory, 12th floor Guy's Hospital, Tower Guy's Hospital, London SE1 9RT</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Willink Biochemical Genetics Unit</td>
<td>Genetic Medicine, 6th Floor, St Mary's Hospital, Oxford, Road, Manchester M13 9WL</td>
<td>Biochemistry</td>
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