



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

**MIDLAND REGIONAL HOSPITAL
TULLAMORE**

**PATHOLOGY DEPARTMENT
USER MANUAL**

Department of Pathology
HSE Dublin Mid-Leinster
Midland Regional Hospital
Tullamore
Co Offaly

10th Edition March 2021

Disclaimer

The information provided in this user manual is correct at the time of writing and is a broad guideline to the use of the most common laboratory requests. Medical and scientific staff in each speciality are available to discuss any aspect of the service in more detail.

Feedback

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Updates of User Manual

The Pathology Department User Manual will be reviewed on a yearly basis and only the current version is valid for use. The latest electronic version is available on the Pathology Department homepage which can be found by logging on to <http://hsenet.hse.ie> and navigating to the Hospital Staff Hub and choosing Midland Regional Hospital Tullamore. Select PPGs MRHT > Laboratories.

Revision History

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| Changes since last revision: | |
|------------------------------|---|
| Section | Details of change |
| General Information Section | <p>Section 1:</p> <ul style="list-style-type: none"> Changed Laboratory Manager to Aidan Fallon <p>Section 2:</p> <ul style="list-style-type: none"> Added Aisling Sweeney as current Acting TSO Added Ultan Smith as current Acting Quality Manager <p>Section 3.2:</p> <ul style="list-style-type: none"> Updated section to reflect new staffing and positional arrangements. Added email contact details for relevant staff |
| Biochemistry section | <p>Section 4.2: Routine Biochemistry/Haematology/External Request form changed to V02</p> <p>Section 4.3: BNP replaced with NTproBNP</p> <p>Section 6: Sample retention table for Biochemistry amended (sample retention now 3 days for all sample types)</p> <p>Section 7: Quality Assurance – RIQAS BNP removed BNP replaced by NTproBNP in test index</p> |
| Blood Transfusion Section | <p>Section 1:</p> <ul style="list-style-type: none"> Clarified that the on-call service provided by the blood bank is an emergency out-of-routine-hours service. Added explanation re the importance of sample/patient identification procedures for transfusion. Added the accreditation status. <p>Section 2:</p> <ul style="list-style-type: none"> Added referral tests for patients on Daratumumab – molecular genotyping, - compatibility testing <p>Section 3:</p> <ul style="list-style-type: none"> Removed routine service hours Updated BB personnel <p>Section 4:</p> <ul style="list-style-type: none"> 4.4 Renamed section "Validity of Transfusion Sample" 4.5 Added other tests/products 4.6 Added clarification re other products <p>Section 5:</p> <ul style="list-style-type: none"> 5.0 clarified the labelling requirement for DAT samples/requests |

| | |
|----------------------------|---|
| | <ul style="list-style-type: none"> 5.1 added line re discouraging the use of PDA label as patient demographics on request form 5.4 & 5.6 added note re the use of non-PDA labels/evidence of other labelling on samples 5.7 clarified the compatibility status of units supplied in the timescale table plus added timescale for the issue of coagulation products 5.9 added note re Termination of Pregnancy <p>Section 6:</p> <ul style="list-style-type: none"> 6.3 added line re provision of blood 6.9 removed link for further information on platelet usage as it no longer exists. |
| External Tests | <p>Section 2.0</p> <ul style="list-style-type: none"> Aluminium Level: Trace metal bottle kept in renal dialysis now. Amiodarone: Sample bottle changed to 1 x EDTA: pink 2.7ml from 1 x serum: amber 4.9 ml. CLL (FISH) changed sample from 2xEDTA: pink 2.7 ml to 2xEDTA: pink 2.7 ml + 1xLith Hep: orange 2.7ml Factor V (Leiden): 2 x EDTA: pink 2.7ml added to sample type requirement HLA Class I Typing for HLA matched platelets: sample requirements changed from 2xEDTA: white/red 7.5 ml to 2xEDTA: red 7.5 ml + serum: amber 4.9ml. Clinical details and platelet count required also. Histoplasmosis Sample requirement changed from 1xEDTA: pink 2.7ml or Biopsy to 1xSerum: amber 4.9ml or Biopsy |
| Haematology section | <p>Section 3.0:</p> <ul style="list-style-type: none"> Removed reference to Fax Machine Added Áine Ryan as CMS. Removed Mr. Gaffar Saka as SMS <p>Section 4.3:</p> <ul style="list-style-type: none"> Table 1: Changed reporting timeframe for Routine Blood Film Examination to reflect current practice. Table 2: Changed timeframe for testing of non-heparinised patients to <24hrs. Table 3: Changed Turnaround Time for Routine Blood Films to 72hrs. <p>Section 4.5:</p> <ul style="list-style-type: none"> Added link to CMD request form |
| Histology Section | <p>Section: 4.3:</p> <ul style="list-style-type: none"> The TAT for muscle biopsies is one week (TAT information provided by Beaumont Hospital) The TAT for renal biopsies varies depending on the complexity of the investigations required: |

| | |
|-----------------------------|--|
| | <p>Immunofluorescence 6-8 days, Light Microscopy 2-3 weeks, Electron Microscopy 4-6 weeks (TAT information provided by Beaumont Hospital)</p> <ul style="list-style-type: none"> TAT for Skin Biopsies for IF is 15 days (TAT information provided by St. James Hospital) <p>Added the following to UKNEQAS Program: Non Gynae Cytopathology diagnostic Module, Bone Marrow, Frozen Section, Tissue Block</p> |
| Microbiology section | <p>Section 2.0</p> <ul style="list-style-type: none"> Added COVID-19 (SARS-CoV-2) <p>Section 3.0:</p> <ul style="list-style-type: none"> Added Oliver Cleary as Specialist Medical Scientist (Molecular) and contact details <p>Section 4.2</p> <ul style="list-style-type: none"> Added updated Microbiology request form <p>Section 4.3:</p> <p>Revised info in the following sample requirements for routine microbiology test tables.</p> <ul style="list-style-type: none"> Added COVID-19 (SARS-CoV-2) Rota/Adenovirus/Cryptosporidium/Giardia/FOB/H. pylori results available within 1 working day Added TAT for HVS/Endocervical/Penile swabs Changed IMMRL to IMSRL Added note to VRE Screens: May be processed if specifically requested by IPCN or the patient is being transferred to another hospital that requires a VRE screen. Must be clearly stated on the specimen request form. Added Urinary Antigen test requirements for Strep. Pneumonia/Legionella pneumophila antigens <p>Section 7.0</p> <ul style="list-style-type: none"> Added QCMD EQA Scheme for SARS-CoV-2 |
| Test Index | <p>Test Index Table Modifications</p> <ul style="list-style-type: none"> Updated index to reflect current test catalogue |

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1. INTRODUCTION

The Pathology Department at the Midland Regional Hospital, Tullamore (MRHT) is comprised of the following key disciplines: Biochemistry, Blood Bank, Haematology, Histopathology and Microbiology. All laboratories are situated together on the ground floor of the hospital.

The Pathology Department is committed to providing a service of the highest quality and shall be aware of and take into consideration the needs and requirements of its users. The purpose of this User Manual is to act as a reference guide for all users of the Pathology Service at MRHT. This User Manual has been prepared to enhance communication with users and to assist them in their dealings with the Pathology Department.

The Pathology Department agrees to comply with Data Protection and General Data Protection Regulation (GDPR) laws 1988 – 2018 with regard to processing personal data. All staff who receive patient personal information are bound by confidentiality and data protection requirements.

The Pathology Department is committed to providing the best possible service, and would appreciate any comments or suggestions, which would improve our service to you.

Aidan Fallon
Laboratory Manager,
Midland Regional Hospital @ Tullamore
Tullamore
Co. Offaly

2. QUALITY MANAGEMENT SYSTEM AND QUALITY POLICY OF THE PATHOLOGY DEPARTMENT

The Pathology Department, MRHT, is committed to providing a high quality, efficient and comprehensive service to its users. The Pathology Department participates in external quality accreditation schemes, such as ISO 15189 which is monitored by the Irish National Accreditation Board [INAB]. MRHT Laboratory is an accredited testing lab: Registration No 221MT. INAB monitors total quality performance and also checks for compliance with the EU Blood directive 2002/98/EC. The quality of results is of fundamental importance and the Pathology Department operates to strict scientific and management standards. Results are authorised within a framework of comprehensive internal and external quality control and assurance. The Pathology Department Quality Policy is included below and may also be viewed wall mounted in the department.

The Pathology Department at MRHT comprising of Microbiology, Haematology, Histology, Blood Transfusion and Biochemistry disciplines, is committed to providing a service of the highest quality and shall be aware and take into consideration the needs and requirements of the users.

In order to ensure that the needs and requirements of users are met, the Pathology Department will:

- Operate a quality management system to integrate the organisation, processes and resources of the Department.
- Set quality objectives and plans to implement this quality policy.
- Ensure that all personnel are familiar with this quality policy to ensure user satisfaction.
- Commit to the health, safety and welfare of its entire staff.
- Ensure visitors to the department will be treated with respect and due consideration will be given to their safety while on site.
- Uphold professional values and be committed to good professional practice and conduct.
- Commit to comply with relevant environmental legislation.
- Commit to comply with Data Protection and General Data Protection Regulation (GDPR) laws 1988 – 2018.

The Pathology Department will comply with the Irish National Accreditation Board Regulations, International standard ISO 15189, current version and Minimum Requirements for Blood Bank Compliance with Article 14 (Traceability) and Article 15 (Notification of Serious Adverse Reactions and Events) of EU Directive 2002/98/EC (AML-BB) where applicable, and is committed to:

- Staff recruitment, training, development and retention at all levels to provide a full and effective service to its users.
- The proper procurement and maintenance of equipment and other resources that are needed for the provision of the service.
- The collection, transport and handling of all specimens in such a way as to ensure the correct performance of laboratory examinations.
- The use of examination procedures that will ensure the highest achievable quality of all tests performed.
- Reporting results of examinations in ways which are timely, confidential, accurate and clinically useful.
- The assessment of user satisfaction, in addition to internal audit and external quality assessment, in order to produce continual quality improvement.
- The safe testing, storage, distribution and transfusion of Blood and Blood Components/Products.
- The investigation and reporting of Serious Adverse Events and Serious Adverse Reactions to the National Haemovigilance Office.
- Provision of Clinical Advisory Services

GENERAL INFORMATION

| Days | Routine Hours | On Call Service |
|--|--------------------------------------|--|
| Monday – Friday Blood Transfusion, Biochemistry, Haematology, & Microbiology | Opening hours 08:00 - 20:00hrs | Emergency On-Call Service provided from 20:00 to 08:00hrs the following day. |
| Histology | 08:00–18:00hrs | |
| Specimen reception | 08:30– 17:45hrs | |
| Saturdays, Sundays and Public Holidays | No routine service. | Emergency On-Call Service provided. |

3.2. CONTACT DETAILS OF KEY MEMBERS OF PATHOLOGY

| CONSULTANT STAFF | | |
|------------------------------------|-------------------------|---|
| Consultant Haematologist | Dr Gerard Crotty | 057-93 58352 (Secretary) (Consultant Haematologist on call can be contacted through reception Ext. 3000) Gerard.crotty@hse.ie |
| Consultant Haematologist | Dr Kanthi Perera | 057 93 59250 (Secretary) (Consultant Haematologist on call can be contacted through reception Ext. 3000) Meegahage.Perera@hse.ie |
| Consultant Histopathologist | Dr Charles d'Adhemar | 057 93 59377 Charlesj.DAdhemar@hse.ie |
| Consultant Histopathologist | Dr Margaret Lynch | 057 93 58383 Margaret.Lynch@hse.ie |
| Consultant Histopathologist | Dr Nurul Nor | 057 93 58279 Nurul.Nor1@hse.ie |
| Consultant Histopathologist | Dr Miriam Walsh | 057 93 58278 Miriam.Walsh@hse.ie |
| Consultant Histopathologist | Dr Nazia Faheem | 057 93 57763 Nazia.fahmeem@hse.ie |
| Consultant Microbiologist | Dr Cathal O'Sullivan | 057 93 58349 CathalE.OSullivan@hse.ie |
| Consultant Chemical Pathologist | Dr Vivion Crowley | Contactable via the Biochemistry Laboratory at 057 93 58504 |

(All Consultant Staff can be contacted directly through Hospital Reception Ext. 3000)

| SCIENTIFIC STAFF | | |
|--------------------|-----------------|--|
| Laboratory Manager | Mr Aidan Fallon | 057 93 59400 aidan.fallon@hse.ie |

GENERAL INFORMATION

| | | |
|---|--|---|
| Chief Medical Scientist Biochemistry | Ms Margaret Martin | 057 93 57778 Margareta.martin@hse.ie |
| Chief Medical Scientist Blood Bank | Ms Bernie Weston | 057 93 58384 Bernie.weston@hse.ie |
| Chief Medical Scientist Haematology | Ms Áine Ryan | 057 93 58309 Aine.gorman@hse.ie |
| Chief Medical Scientist Histology | Ms Naomi Cronin | 057 93 58389 Naomi.cronin@hse.ie |
| Chief Medical Scientist Microbiology | Ms Rose McNerney | 057 93 58390 Rose.mcnerney@hse.ie |
| OTHER STAFF | | |
| Transfusion Surveillance Officer | Ms Denise Murphy Current Acting: Aisling Sweeney | 057 93 58350 |
| Medical Scientist with Responsibility for IT | Mr Aidan Fallon | 057 93 58312 Aidan.fallon@hse.ie |
| Laboratory Quality Manager | Ms Orlaith McDonnell Current Acting: Ultan Smith | 057 93 57752 Orlaith.mcdonnell@hse.ie Ultanf.smith@hse.ie |
| Microbiology Surveillance Scientist | Ms Breda Duffy Ms Grace O Keffe | 057 93 57774 breda.duffy@hse.ie grace.okeeffe1@hse.ie |

GENERAL ENQUIRIES: LABORATORY SECTION

| | |
|--|--|
| Blood Transfusion | 057 93 58385 |
| Biochemistry | 057 93 58504 |
| Haematology | 057 93 58351 |
| Histopathology | 057 93 58338 |
| Microbiology | 057 93 58371 |
| Pathology Office | 057 93 58342 Histology Secretary 057 93 58379 Laboratory accounts 057 93 59396 Demographics |
| Specimen Reception and External Test Enquires | 057 935 58354 |

3.3. ON-CALL SERVICE AND CONTACT NUMBERS

| On Call Service | On call disciplines | Contact |
|-----------------|---------------------|---------|
|-----------------|---------------------|---------|

| | | |
|--|---|---|
| Emergency On-Call Service provided from 20:00 to 08:00 the following day and on a 24h basis on Saturdays, Sundays and Public Holidays. | Medical Scientist cover for Blood Transfusion and Haematology | Can be contacted through reception (057) 932 1501 Internal Ext. 3000) or Lab On Call Mobile 086 0482356. |
| | Medical Scientist cover for Microbiology and Biochemistry | Can be contacted through reception (057) 932 1501 Internal Ext. 3000) or Lab On Call Mobile 9-2pm Biochemistry 0867742465 9-2pm Microbiology 0867777347 2pm on 0867742465 |
| Laboratory Consultant Outside of Hours Emergency Contact | Haematology, Histopathology, Microbiology | Consultant on Call Can be contacted through reception (057) 932 1501 Internal Ext. 3000) or Lab On Call Staff |
| Mortuary | Mortuary Services | Can be contacted via Nursing Administration through reception (057) 932 1501 Ext 58489/8490 |

This service is for genuine medical emergencies only, where the results are likely to influence immediate management of the patient. Call out after 12 midnight should be curtailed as much as possible. On call Medical Scientists should be contacted when an on call test request is required.

The request form accompanying the emergency sample must be fully completed as per **Section 7** "Pathology Policy on Request Form Completion and Specimen Labelling". **Please ensure that the green on call Biochemistry and pink Haematology request forms are completed individually for on call Biochemistry and Haematology tests. The regular Microbiology specimen request form is also used for on call test requests.**

Results of tests performed during emergency service hours are returned to the location stated on the request form via the pneumatic chute system. Results are available on the Ward Inquiry System where applicable.

Laboratory Tests Routinely Available On-Call

| | |
|-------------------------------------|--|
| Biochemistry | Glucose U/E and Creatinine Cardiac Enzymes / CKMB Tn-T CRP Amylase Calcium Albumin LFTs CSF glucose and protein Alcohol / Paracetamol / Salicylate Vancomycin / Gentamicin Urine 'drugs of abuse screen' for ED All other Biochemistry tests will be deferred until the next routine working day. |
| Haematology/ Coagulation | FBC ESR (only with relevant clinical details and signature of requesting doctor) Infectious Mononucleosis Screen (if urgent please call the Haematology Laboratory) Coagulation Screen (PT/APTT) D-Dimers Malaria- experienced staff may need to be called in to screen blood films Sickie Screen – Contact Laboratory to notify them when sample is sent |
| Blood Transfusion | Blood Group and Antibody Screen / Crossmatch / Urgent blood products as required |
| Microbiology | CSF Blood Cultures Urines from ED and Children's Ward (with relevant clinical details) Pregnancy tests Urgent swabs, fluids, tissues (Contact on call MS to confirm) |

For requests for tests not listed above – the requesting doctor must contact the appropriate Laboratory Consultant in order to justify same.

3.4. LOCATION AND ACCESS TO THE PATHOLOGY DEPARTMENT

The Laboratory is situated at the end of the new hospital main concourse, between the Pharmacy Department and the Mortuary. Access to the Pathology Laboratory is restricted to hospital personnel at all times.

- Specimens being delivered by non-hospital staff can be placed in the designated fridge for pathology samples situated near Hospital Reception or dropped directly into the Laboratory Specimen Reception area.
- Out of hours access to the Pathology Department is restricted to Hospital Portering staff and other authorised staff for delivery of urgent specimens, etc. Staff trained to collect blood products can access the Blood Issue Room using their swipe card.
- Additional access can be arranged via the hospital switch or the on call medical scientist

3.5. SPECIMEN DELIVERY FROM WITHIN THE HOSPITAL

- During routine Pathology opening times, samples are collected from designated collection points throughout the hospital by the laboratory attendant. Scheduled times for collection are detailed at each collection point. Collection at each point is signed off when it occurs.
- Samples are also delivered to the laboratory by hospital porters.
- Histology samples are delivered directly to the Histology Laboratory.
- Samples are sent to the Pathology Department via the Pneumatic chute system. Only red carriers are to be used to send specimens to the Pathology Department. Only permitted samples may be sent via the chute. See tables below for a list of specimens/products that cannot be delivered via the chute system and also the relevant laboratory pneumatic chute station numbers for routine and on call hours.

3.5.1 List of Samples/Products that **must not be** delivered via the Chute

| Sample Type | Comment |
|---|---|
| Albumin for infusion | |
| Blood gas samples | |
| Bone marrow biopsies | Bottles available in the Histology Laboratory. Hand deliver. |
| Coagulation products | |
| CSF samples | Hand deliver; phone laboratory in advance |
| Cytology samples | |
| Factor assays | Hand deliver to Specimen Reception |
| Specialist coagulation tests | Thrombophillia screen, Factor assays, VWF |
| Glass bone marrow blood culture bottles for TB | Bottles available from Specimen Reception. Hand deliver |
| Histology samples | |
| Schilling test samples | |
| Thrombophilia Screens | Hand deliver to Specimen Reception |
| Blood Components for transfusion | i.e. Red Cell Concentrate and Platelets |
| Blood Products or Factor Concentrates | i.e. SD Plasma, Prothrombin Complex Concentrate(Octoplex), Fibrinogen |
| 24Hr Urine Containers | |
| Items >1 kg in weight | |

3.5.2 Delivery of specimens via the Pneumatic Chute during Hours: 08:00 – 17:45 Monday–Friday

| Specimen type | Send to Laboratory Station |
|--|----------------------------------|
| Samples for Biochemistry, Haematology, Coagulation and External tests | Specimen Reception - 8354 |
| Blood group / cross-match samples | Blood Transfusion - 8385 |
| All Microbiology samples should be sent directly to the Microbiology Laboratory. | Microbiology - 8371 |

3.5.3 Delivery of specimens via the Pneumatic Chute Out of Hours: 17.45 – 08:00 Monday–Friday, and all day Saturday, Sunday and Public Holidays.

| Specimen type | Send to Laboratory Station |
|---|----------------------------|
| Biochemistry | Biochemistry - 8504 |
| Blood group / Cross-match samples Haematology / Coagulation samples | Haematology - 8351 |
| All Microbiology samples should be sent directly to the Microbiology Laboratory | Microbiology - 8371 |

3.6. SPECIMEN DELIVERY FROM OUTSIDE THE HOSPITAL

- Samples are delivered by GPs, couriers and taxi directly to the laboratory specimen reception area.
- Samples may be delivered by patients or GPs to a designated fridge for pathology samples situated near Hospital Reception or directly to the laboratory specimen reception area.
- Samples are delivered by taxi from Kilbeggan, Tyrellspass, Edenderry, Rhode, Daingean, Birr, Banagher and Kilcormac.
- There is a taxi service for specimen delivery from Portlaoise and Mullingar laboratories daily.
- Additional access can be arranged via the hospital switch or the on call medical scientist

4. DEFINITIONS

Emergency On-Call Service: On-Call Service provided for emergency specimens.

ED: Emergency Department.

External Laboratory: An external laboratory is a laboratory which performs tests on specimens not processed in the laboratory at MRHT.

LIS: Laboratory Information System.

MRHT: Midland Regional Hospital @ Tullamore.

OPD: Out Patients' Department.

Referral Laboratory: A referral laboratory is an external laboratory to which a specimen is submitted for a supplementary or confirmatory examination procedure and report.

Turnaround Time (TAT): Time of arrival of specimen in the laboratory to the time of authorisation of results. This refers to specimens processed in the laboratory at MRHT only. It does not refer to specimens sent to external laboratories for analysis.

Urgent: Specimens labelled '**Urgent**' will be prioritised in the laboratory process.

5. HEALTH AND SAFETY

All biological specimens should be considered as potentially hazardous and handled accordingly.

General Safety Guidelines

- ❖ Always use approved sample collection containers and ensure lids are securely closed.
- ❖ Observe Standard Health and Safety Precautions when taking patient samples.
- ❖ Always dispose of sharps appropriately and according to the MRHT waste disposal policy given in the Infection Control Guidelines which are located in Microbiology.
- ❖ Samples (except 24h urines) must be placed in approved biohazard bags with request form placed separately in the sleeve provided or in specibags with the form attached. **DO NOT PLACE SAMPLE AND FORM TOGETHER IN SAME BAG.**
- ❖ Always supply clinical information including known infection risk with each request.
- ❖ Any spills must be dealt with in accordance with MRHT spill procedure as given in the hospital Infection Control Guidelines which are located in all clinical areas.

6. SPECIMEN COLLECTION AND TRANSPORTATION

6.1 Patient Preparation for Laboratory Tests

PATIENT PREPARATION FOR LABORATORY TESTS

For most routine laboratory tests; no special patient preparation is required. Where given, special instructions should be strictly adhered to, to avoid misinterpretation of test results. Refer to individual test information for details.

6.1.1 Fasting Samples: When fasting samples are required, the patient must abstain from all food or drink (except water) for 12 hours (unless

otherwise stated e.g. 8 hours for fasting glucose -refer to individual test information for details).

6.1.2 24 Hour Urine Samples

Refer to individual test information for details regarding required preservative or special instructions.

It is very important that all urine passed in an exact 24 hour period is collected. Loss of any urine or a collection made for either more or less than 24 hours will invalidate the tests and might lead to an incorrect diagnosis.

Urine should not be passed directly into the 24-hour container, but into a suitable clean detergent-free jug and then poured into the 24-hour container.

If the container contains acid (used as a preservative) or has a warning label, then care needs to be exercised when adding urine from the collection vessel. Hydrochloric acid causes burns and is irritating to eyes, skin and respiratory system. If it comes in contact with skin, the affected area should be washed immediately with plenty of water and medical advice should be sought. Containers should be kept out of reach of children. Acid preservative is not to be taken internally. The laboratory provides an information leaflet when containers are provided. This should be read carefully.

Ensure that the request form and sample container are labelled as instructed in section 7.

Instructions for sample collection

- Empty your bladder at 7am on rising (or at a more convenient time) and **discard** the sample. The collection is started after this sample has been passed. Write the start time on the specimen container label.
- Collect all urine in the container provided on **every** occasion that it is passed during the following 24 hours and store refrigerated if possible (except for uric acid – room temperature storage required).
- Empty the bladder at 7am on rising the next morning (or at the more convenient time chosen) and add this sample to the collection.
- Write the finish time on the container label.
- Bring the container to the laboratory on the day of completion.

Incomplete collections

- If a sample is forgotten or lost down the toilet, then all the urine collected to this point should be thrown away and the collection re-started the following morning.
- If the incomplete sample is an acid collection, the original container should be returned to the laboratory and a new one requested.

CONTAINERS:

24 hr urine containers are available for collection from the laboratory during routine hours (refer to section 3.1).

6.1.3 Urine for Chlamydia and Neisseria gonorrhoea PCR

- Specimen collection and handling instructions should be carried out **as per collection kit**.
- **Patient forename, surname and DOB** are essential for processing. Please note the specimen container label has a designated area for patient name and ID only; however patient DOB is essential and should **also** be wrote on the container.
- Fill urine container to between the two lines of the 'Fill Area' as indicated on side of container.
- Wipe any remaining urine from container with tissue.
- Wash you hands thoroughly with soap and water.
- Label the specimen with **patient forename, surname and DOB**.
- Please state the time taken on the request form.
- Check that the request form details the full name and date of birth of the person providing the sample and add the date and time of the sample collection.
- The sample should be brought promptly to the laboratory for analysis.
- A report will be sent to the requesting doctor, usually within 2-3 working days.

6.1.4 Urine for Pregnancy test

- Early morning urine is recommended for pregnancy test.
- Use a sterile universal container to catch mid stream urine.
- There is no need to fill the container. Screw the lid firmly back on the container.
- Wipe any remaining urine from container with tissue.
- Wash your hands thoroughly with soap and water.
- Label the specimen with **patient forename, surname and DOB**.
- Please state the time taken on the request form.
- Check that the request form details the full name and date of birth of the patient providing the sample and add the date and time of the sample collection. Ensure to add the test requested.
- The sample should be brought promptly to the laboratory for analysis.
- A report will be sent to the requesting doctor, usually within 2-3 working days.

6.1.5 Urine for Urine Microscopy/Culture/Sensitivity

- Use a sterile universal container to catch mid stream urine
- There is no need to fill the container. Screw the lid firmly back on the container.
- Wipe any remaining urine from container with tissue.
- Wash your hands thoroughly with soap and water.
- Label the specimen with **patient forename, surname and DOB**.
- Please state the time taken on the request form.
- Check that the request form details the full name and date of birth of the patient providing the sample and add the date and time of the sample collection. Ensure to add the test requested.
- The sample should be brought promptly to the laboratory for analysis.
- A report will be sent to the requesting doctor, usually within 2-3 working days

6.1.6 Urine for Urine Legionella/Streptococcus pneumoniae Antigen Test

- Reserved for ICU patients only. Clinician must contact the Consultant Microbiologist if they require urine Streptococcus pneumonia/Legionella antigen testing on non-ICU patients.
- Use a sterile universal container to catch mid stream urine
- There is no need to fill the container. Screw the lid firmly back on the container.
- Wipe any remaining urine from container with tissue.
- Wash your hands thoroughly with soap and water.
- Label the specimen with **patient forename, surname and DOB**.
- Please state the time taken on the request form.
- Check that the request form details the full name and date of birth of the person providing the sample and add the date and time of the sample collection.
- The sample should be brought promptly to the laboratory for analysis.
- A report will be sent to the requesting doctor, usually within 2-3 working days.

6.1.7 STOOL SPECIMEN COLLECTIONS

General Patient Instructions for Stool collection:

- Label the specimen with **patient forename, surname and DOB**.
- Place plenty of toilet paper in the toilet bowl.
- 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 onto the toilet paper.
- Open the specimen container. Place a sample of the faeces in the specimen container. There is no need to fill the container. Screw the lid firmly back on the container.
- DO NOT ALLOW URINE OR TOILET WATER INTO THE CONTAINER.
- **Note:** If you have severe diarrhoea or a watery stool, a potty may be needed to collect the initial sample.
- Place the container in the plastic bag attached to the form and seal the bag.
- Flush away the remaining paper and faeces.
- Wash hands thoroughly with soap and water.
- Check that the request form details the full name and date of birth of the person providing the sample and add the date and time of the sample collection.
- The sample should be brought promptly to the laboratory for analysis.
- A report will be sent to the requesting doctor, usually within 3 working days.
- **Note:** Avoid consuming the following as these products can interfere with Test Results:
 - Antacids
 - Anti diarrheal Medications
 - Oily Laxatives
 - Barium or Bismuth

6.1.8 Stool for Occult Blood

Diet and drugs may affect results of occult blood testing. Please talk to your physician before making any changes in diet or medications prescribed for you.

One stool specimen should be collected into a clean container and should not be contaminated with urine or water.

6.1.9 SPUTUM FOR CULTURE AND ACID FAST MYCOBACTERIUM (AFB)

- Patient should rinse mouth and gargle with water immediately prior to collection
- Collect specimen from deep cough into a sterile container. Patient should avoid any contamination with saliva.
- Label the specimen with **patient forename, surname and DOB.**
- Check that the request form details the full name and date of birth of the person providing the sample and add the date and time of the sample collection. Ensure to add the test requested.
- Return specimen as soon as possible (preferably within half an hour of collection). If there is a delay, specimen should be refrigerated. Please label the specimen container with patient's name, date and time

6.2 Specimen Collection

It is the responsibility of the doctor, nurse or phlebotomist taking the sample to:

- ❖ Ensure that all appropriate sterile equipment is within date and all packaging is intact.
- ❖ Explain the procedure and rationale to the patient, answering any questions, thus ensuring an informed verbal consent is obtained.
- ❖ Check the patient identification.
- ❖ Ensure the patient is fasting, if required.
- ❖ Take the sample(s) into the appropriate specimen container(s) for the tests required and ensure blood tubes are used according to the recommended draw order.
- ❖ **Label the specimen container(s) correctly.**
- ❖ **Ensure the request form is properly completed. Ensure to add the test requested.**
- ❖ Dispose of all needles into a sharps bin when finished sampling.
- ❖ Dispose of all contaminated materials into a biohazard bin.

Please follow these guidelines

- ❖ Transport specimens at room temperature unless otherwise stated.
- ❖ Use approved sample collection containers.
- ❖ Use approved sample collection biohazard bags which can contain any spills or leaks within the bag.
- ❖ Use the Pneumatic Chute System if in-house and appropriate to sample type.
- ❖ Do not try to carry multiple specimens by hand.
- ❖ Do not leave samples in other locations en route to the laboratory.
- ❖ Do not transport broken or leaking samples from their source- report to relevant supervisor.
- ❖ If required follow appropriate spill procedures as given in the MRHT Infection Control Guidelines.

During the process of transporting patient samples to the laboratory it is essential that samples are transported safely and efficiently in order to:

- ❖ Ensure safe custody and integrity of the sample which must reach the laboratory in proper condition and in a timely manner.
- ❖ Ensure the safety of staff transporting samples.
- ❖ Ensure the safety of other staff, patients and members of the public.

Please Note: THE PNEUMATIC CHUTE SYSTEM - IF APPROPRIATE TO THE SAMPLE TYPE- IS THE PREFERRED METHOD OF DELIVERY OF SAMPLES TO THE LABORATORY (Restrict non urgent Microbiology specimens to ward collections)

Please refer to specific instructions in the relevant laboratory sections of this user manual for transport of samples which require special conditions or handling. If in any doubt please contact the relevant laboratory discipline by telephone.

6.3 Packaging of diagnostic specimens from GP surgeries

It is the responsibility of all persons sending samples to the laboratory to adhere to national and international regulations ensuring that specimens sent to the laboratory do not present a risk to anyone coming in contact with them during transportation or on receipt in the laboratory. Carriage of goods by road must comply with the European Agreement Concerning the International Carriage of Dangerous Goods by Road regulations, current version.

Instructions:

1. The packaging must be of good quality, strong enough to withstand the shocks and loadings normally encountered during carriage.
2. The packaging must consist of at least three components:
 - a. A leakproof primary receptacle e.g. blood collection tube, MSU container;
 - b. A secondary sealable package to enclose and protect the primary container(s), e.g. plastic specimen bag.
 - c. Outer package: the secondary package is placed in an outer transport container with suitable cushioning that protects it and its contents from external influences such as physical damage and water while in transit.
3. Samples should be transported to the Laboratory as soon as possible after collection. **Samples should not be stored in ward areas or in GP practices overnight or over the weekend.** Samples that are not transported in a timely manner to the laboratory may be rejected if there is any doubt about the sample integrity

6.4 Guidance on the Storage and Transport of Specimens to the Laboratory for Patients delivering specimens themselves.

Specimen Storage Conditions

In the event where patient specimens cannot be delivered to the laboratory on the same day, they should be packaged securely by the GP/Practice Nurse and patients should **refrigerate them** as soon as possible and overnight if necessary in a domestic fridge (temperature between 2-8°Celsius).

Transport of Patient Specimens

All specimens should be brought to the Hospital as soon as possible and placed in the secure fridge at the main Hospital Reception. Specimens **must not** be placed in direct sunlight or beside radiators or windows while being transported to the laboratory.

It is the responsibility of the GP/Practice Nurse to inform patients of the storage and transport conditions of samples in the event of patients delivering samples to the laboratory themselves. Adhering to these storage and transport conditions will ensure sample integrity is preserved.

6.5 Key Factors that may affect test performance or interpretation of results

The following key factors are essential to ensure correct test performance or interpretation of results when taking samples and filling in request forms:

- Patient details must be correct on the request form and specimen
- Relevant clinical details must be on the request form
- Correct identification of the patient
- Samples must be taken in the appropriate manner, order of draw and correct volumes
- Samples must be placed in appropriate containers/blood tubes
- Samples must be appropriately labelled (see Blood Transfusion for specific labelling requirements)
- Samples must not be poured from one blood tube into another (e.g. anticoagulant, cross-contamination)
- Coagulation samples must not be contaminated with heparin from extraneous sources such as flushing a line
- Samples must not be taken from an arm with a running I.V.
- Clotted plasma/FBC/coagulation samples or samples containing fibrin strands will affect results
- High lipid levels in the plasma of samples will adversely affect Haematological investigations and some Biochemistry analytes
- Samples will be adversely affected by delay in receipt to the laboratory (date and time of sample collection should be indicated on the sample/form)
- Samples will be adversely affected by heat/cold degradation

7. PATHOLOGY POLICY ON REQUEST FORM COMPLETION AND SPECIMEN LABELLING

This Policy applies to specimens being submitted for analysis across all laboratory disciplines at the MRHT. The purpose of this Policy is to ensure

- Uniformity of requirements across the various Laboratory Disciplines in line with INAB and ISO15189 Standards.
- Information on both the laboratory specimen request form and the corresponding clinical specimen is sufficient to unambiguously link the two together to ensure the correct results/products are issued for the correct patient.
- The Laboratory receives adequate information on the specimen request form to permit correct analysis and interpretation of results.
- The Laboratory records accurate and complete patient and specimen identification for each request received.

Pathology specimen request forms and specimen containers are provided by the Pathology Department at the MRHT to meet minimum Health & Safety requirements for labelling and transport of biological specimens.

7.1. SELECTING THE REQUEST FORM

It is important that the correct form is supplied for a particular test request. Details of the correct request form and the type and volume of sample required for a particular assay are given in the relevant laboratory sections in this manual.

The Blood Transfusion Request Form is used to request:

- a. Group and Antibody Screen.
- b. Group, Screen and Cross-match for units of RCC.
- c. Issue of Plasma, Platelets, Coagulation Factors and other laboratory based blood products.
- d. Direct Antiglobulin Test (DAT)/Direct Coombs Test (DCT).

The General Biochemistry/Haematology Request Form is used to request the following tests during routine hours:

- a. Haematology and Coagulation tests: FBC, PT, *etc.*
- b. Biochemistry tests: all general biochemistry tests, tumour markers, HbA1c, and urine biochemistry tests.
- c. External tests: all tests sent to external laboratories.

(Use the relevant pink Haematology Request Form or green Biochemistry Request Form during on call hours)

The Histopathology Request Form is used to accompany all specimens sent to the Histopathology Laboratory for analysis, including Cytology samples.

The Microbiology Request Form is used to accompany all specimens sent to the Microbiology Laboratory.

7.2. COMPLETING THE REQUEST FORM

The following outlines the procedure for completion of laboratory request forms with the exception of the form for Blood Transfusion which is dealt with in the Blood Transfusion section of this manual.

It is the responsibility of the Requester/Person taking the specimen to ensure the laboratory is provided with complete and accurate patient identification details on both the request form and specimen container.

All requests should be submitted by completing the relevant request form and inserting the labelled specimen into the attached plastic bag or a biohazard bag, where appropriate. (May not apply to some specimens e.g. 24 hr urines and specimens for Histology).

Computer generated labels should be used on the request forms for hospital patients or those attending ED or OPD – one label required for each sheet on the request form.

Hand-written forms for hospital patients will be accepted in an emergency. Hand-written forms will also be accepted from General Practitioners. All writing on the request form must be clearly legible (block capitals preferred) so that the

information provided is legible, thus ensuring proper identification of the patient and all tests requests. Writing should be in ballpoint pen (not marker) to ensure the information is copied through to each sheet of the request form.

Information Required on the Request Form

- a) **Patient Surname and First Name/s (unabbreviated).**
- b) **Patient date of birth.**
- c) **Patient's address.**
- d) **Patient hospital ID (Chart Number)** for patient in hospital, if available.
- e) **Ward/GP Location.**
- f) **Requesting Doctor/GP Name.**
- g) **Requesting Doctor bleep** where applicable.
- h) **Patient Gender.** This information is required for the selection of appropriate reference values.
- i) **Test request(s).**
- j) **Date and time of specimen collection.**
- k) **Name of person collecting the specimen.**
- l) **Fasting status**, if relevant.
- m) **Specimen type and anatomical site of origin**, where applicable.
- n) **Clinical details/Medications/Recent antibiotic history/Recent foreign travel**, where applicable.

7.3. SPECIMEN LABELLING

The following outlines the procedure for labelling specimens for the Laboratory. Additional information required for labelling of Blood Transfusion and Microbiology specimens is dealt with in the Blood Transfusion and Microbiology sections of this manual.

Correct identification of the patient before collection of the sample is essential.

Specimens are to be labelled using legible handwriting (ballpoint pen) or using a small computer generated label or using the BloodTrack label. Blood transfusion samples can only be accepted if they are legibly hand written or labelled with a BloodTrack label. Current Hospital Addressograph labels are not suitable for blood samples as they overlap the specimen container.

For instructions on the use of the BloodTrack system see T/HVBT/GL/001 "Guideline for Sample Labelling and Completion of the request Form for Blood Transfusion" (available in Haemovigilance Folder in the clinical areas). For training and access to the BloodTrack system, contact the Transfusion Surveillance Officer Bleep 290 or Blood Bank, Ext. 58385

Information Required On the Specimen

- a) **Patient surname and first name/s, (unabbreviated).**
- b) **Patient date of birth.**
- c) **Patient hospital ID (Chart Number)** for patient in hospital, if available.
- d) **Date and time of specimen collection.**

- e) **Name of person who took the specimen**, where applicable.
- f) **Ward/GP Location**.
- g) **Specimen type and anatomical site of origin** for Histopathology and Microbiology specimens, where applicable.

Note: it is mandatory to have a) and b) identical on both the sample and the request form for sample acceptance.

7.4. SPECIMEN REJECTION

The labelling requirements outlined above are both for the safety of the patients and for medico-legal protection of hospital staff.

Requests for laboratory investigations will be checked by laboratory staff for adequate patient identification on the form and specimen and suitability of samples for the tests requested. Specimens not meeting with the above labelling criteria, or where there is ambiguity between the request form and the specimen, will be rejected by Laboratory personnel.

Exclusions to the acceptance/rejection criteria exist for irretrievable primary samples and depending on the type of discrepancy, Laboratory personnel may contact the requesting doctor for clarification of the specimen.

Specimens that are not processed and rejected include:

- ❖ Non urgent specimens that do not have the full name and DOB on both specimen and request form.
- ❖ Unlabelled repeatable specimens.
- ❖ Leaking specimens that would pose a health and safety risk to staff.
- ❖ Expired bottles.
- ❖ Incorrect/insufficient/overfilled specimens unsuitable for analysis.

In the case of sample rejection, the reason for rejection will be recorded on the Laboratory Information System. The patient's report will state that the sample was rejected and notify clinical staff of the request for a new specimen. In the case of rejected samples, the doctor/phlebotomist/ward will be informed by telephone and a new specimen will be requested.

Note: For Blood Transfusion Specimen Rejection Criteria refer to the Blood Transfusion section of this manual for further details.

Disputes:

Where a dispute arises in relation to a sample, the final decision on suitability for testing will lie with the Chief Medical Scientist in the relevant Laboratory discipline.

7.5. REQUESTING ADDITIONAL TESTING

If on sending a specimen for testing, further additional tests are required, please contact the relevant laboratory discipline to check the feasibility of using the initial specimen for analysis as the age of the specimen may impact on the validity of test results. Laboratory staff will advise if the initial sample is still valid and will require the test request to be sent in written format on another patient request form or Additional Tests Form for Blood transfusion.

8. FREQUENCY OF TESTING

- ❖ The frequencies stated in this handbook refer to normal working days.
- ❖ The frequencies do not take into account cases where testing of samples need to be repeated for scientific or quality control reasons.
- ❖ The days quoted are 'averages' and the Laboratory at MRHT will do its utmost to achieve them, circumstances permitting.

9. RESULT REPORTING

- ❖ Biochemistry, Haematology, Microbiology and Coagulation results are available on the Ward Enquiry screen (where applicable) and via Healthlink to participating GPs as soon as tests are authorised by scientific staff.
Note: Contact the Medical Scientist with responsibility for IT for Ward Enquiry User access requests, Healthlink and general IT enquiries. Refer to 3.2 for contact detail information.
- ❖ Written reports are issued to the wards twice daily, Monday to Friday, via the laboratory attendant at 14:00 and via the pneumatic chute at 17:30.
- ❖ Reports are posted to GPs each evening.
- ❖ Histopathology reports are available in hardcopy only.
- ❖ Medical Scientists on call return reports to the clinical area via the chute system.

10. LABORATORY SUPPLIES

10.1. ORDERING OF LABORATORY SUPPLIES

The Laboratory Attendant processes all requests for sample containers and request forms.

10.1.1 Supplies for Wards/Departments in the Hospital

Wards and Departments of MRHT are supplied with laboratory supplies either via the Kan Ban system or directly from the Pathology Department. Where the Kan Ban system is in place, supplies are topped up by a Supplies Officer from Central Stores on an ongoing basis.

Where supplies need to be collected from the Pathology Department, the Ward/Department must fill in the "Laboratory Supplies Order Form" listing the items required and send it to the Pathology Department on Monday or Thursday. The Laboratory Attendant will complete the orders and have them ready for collection between 11.00 and 13.00 on Tuesday and Friday.

10.1.2 Supplies for GP's, Community Hospitals and Other Users

A minimum of 2 working days notice is required to fulfil an order. GPs or community hospitals must fill in the "Laboratory Supplies Order Form" and fax it to the laboratory at 057 9358363 before Tuesday at 12:00. In exceptional circumstances, orders may be telephoned to 057 9358347. Completed orders will be left for collection on Thursdays and Fridays during routine working hours in the designated area of the Pathology Department.

The Pathology Department requests that users of the service do not arrive with requests to be filled while they wait. Your co-operation will ensure a fast and efficient service.

Note: Please do not ask for supplies during on call hours. Supplies are never available from on-call staff.

10.2. SPECIMEN TUBES FOR BLOOD COLLECTION

Acknowledgement: Mr Jim Chapman, Sarstedt Ireland Ltd, for his kind permission to reproduce the images of Sarstedt tubes and needles.



Serum Gel: Amber 4.9 ml

Product No: 04.1935.001

Most routine tests for Biochemistry, Immunology, Endocrinology.



Flouride: Yellow 2.7 ml

Product No: 05.1073.001

Glucose test. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



EDTA: Pink 2.7 ml

Product No. 05.1167.001

FBC (Full Blood Count)& ESR, HbA1c, PTH. Separate bottle required for each. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



EDTA as above but: Pink 7.5 ml

Product No: 01.1605.006

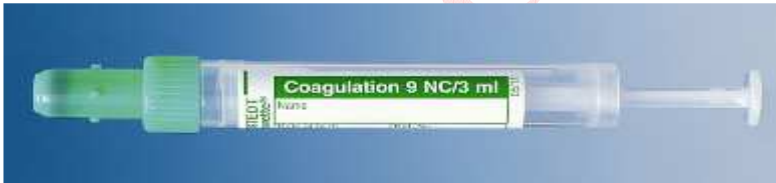
Blood Transfusion tests only. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



ThromboExact: Fuchsia Pink 3 ml

Product No: 05.1168.001

Platelet count: For suspected or known cases of pseudothrombocytopenia (platelet clumping or platelet satellitism). This sample is only available upon request from the Haematology laboratory and should always be received with an EDTA 2.7ml sample. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times



Sodium Citrate: Green 3 ml

Product No: 05.1165.001

Coagulation tests: Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times. Overfilled or under-filled bottles **cannot** be processed.



Lithium Heparin: Orange 2.7 ml

Product No: 05.1553.001

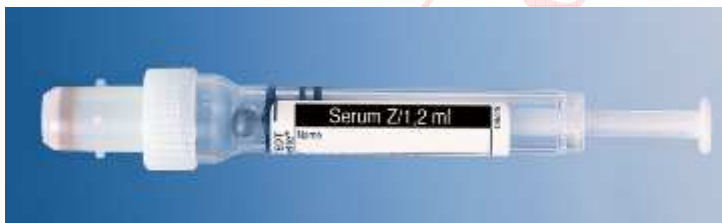
Renal Dialysis Patients and some Oncology patients: Most routine tests for Biochemistry, Immunology, Endocrinology. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



Lithium Heparin: Orange 7.5 ml

Product No: 01.1604.400

Used for trace metal tests. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times. Use with metal free needle (85.1162.400) only.



Paediatric: Serum tube 1.2 ml .

Product No: 06.1663.001

Most routine tests for Biochemistry, Immunology, Endocrinology.



EDTA: Pink 1.2ml

Product No: 06.1664.001

Paediatric - FBC (Full Blood Count) & ESR. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



Flouride: Yellow 1.2ml.

Product No: 06.1665.001

Paediatric - Glucose test. Please ensure that the bottle is filled to the correct mark and mixed well by gently inverting the sample 4-5 times.



Safety Needle.

Product No: 85.1162.200

Needle 21G x 1.5"

10.3. ORDER OF DRAW WHEN SAMPLING USING THE MONOVETTE SYSTEM

If the Monovette system is used as designed, cross-contamination should not occur, as the caps are not removed from the tubes. Due to the vacuum the tubes will also automatically fill with blood to the appropriate fill-line. The tubes are siliconised to reduce adhesion of clots to tube walls and cap, and to reduce risk of haemolysis. **The CLSI guidelines for order of sampling are as follows:**

| Order | Tube | Colour |
|-------|--|---------------|
| 1. | Take blood cultures first (if required) | |
| 2. | Citrate | Green* |
| 3. | Serum (with gel) | Amber |
| 4. | Heparin | Orange |
| 5. | EDTA | Pink |
| 6. | Fluoride-Oxalate | Yellow |

***It is recommended to draw a discard tube first when a coagulation (green citrate) tube is the first tube needed.**

11. PATHOLOGY SERVICES AVAILABLE

11.1 Other Pathology services available

| Service | Description |
|-------------------------------|--|
| Advisory Services | <ul style="list-style-type: none"> The Laboratory Consultants and Senior Scientific staff provide an extensive advisory service to all users of our service. Pathology staff have representatives on a number of Hospital and Regional committees <i>e.g.</i> Hospital Transfusion Committee, Regional Transfusion Committee, Partnership Committee, National LIS committee. Feedback is given to the nursing staff from the Transfusion committee by the Haemovigilance Officer at CNM meetings. Feedback from all other meetings is given to Laboratory staff Quality/Management/Staff meetings. |
| Autopsies | Please inform Nursing Administration as soon as an autopsy (either consented or Coroners) is required. |
| Complaints | The Laboratory documents all grievances from Clinicians, Patients or other related parties and investigates these as formal complaints in accordance with the Pathology Department complaint procedure. In order to make a complaint please contact the appropriate Department, the Laboratory Manager or the Quality Manager (refer to 3.2 for contact details) |
| Haemovigilance Service | The Haemovigilance service in the MRHT is part of the Midland Regional Hospitals joint Haemovigilance service. This is a Consultant led service with a Transfusion Surveillance Officer (TSO) based at each site. The National Haemovigilance scheme is dedicated to the achievement of a national standard practice and quality of care for all patients, before, during and following completion of transfusion. Further information can be obtained from the Transfusion Surveillance Officer (Ext. 58350.) |
| Point of Care Support | The Biochemistry Laboratory support some Point of Care (POC) instruments in the hospital <i>e.g.</i> Blood Gas analyser in ICU and ED, glucometers on wards. |
| Warfarin Clinic | An outpatient Warfarin clinic is available. This clinic operates on a daily basis (Mon-Fri) 08:30 to 10:45. Contact anticoagulation Clinical Nurse Specialists at 58601/58641. |

11.2 Policy on protection of personal information

The Pathology Department is committed to complying with Data Protection and General Data Protection Regulation (GDPR) laws 1988 – 2018 and is committed to protecting the privacy of personal information of its service users and patients. In the course of their work, health service staff are required to collect and use certain types of information about people, including 'personal data' as defined by the Data Protection Acts.

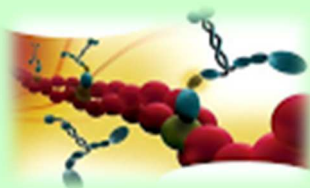
The HSE has a responsibility to ensure that this personal data is;

- 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 Acts 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 on the HSE website.

BIOCHEMISTRY LABORATORY



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2. BIOCHEMISTRY TEST INDEX

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4.2 FORM AND SAMPLE LABELLING REQUIREMENTS

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4.4 SAMPLE REQUIREMENTS FOR URINE BIOCHEMISTRY TESTS

4.5 SAMPLE REQUIREMENTS FOR CSF BIOCHEMISTRY TESTS

5. SAMPLE TURNAROUND TIMES

6 SAMPLE RETENTION

7. QUALITY ASSURANCE

1. INTRODUCTION

The Biochemistry Laboratory at Midland Regional Hospital, Tullamore provides a routine biochemistry service to the hospital and to general practitioners in the local area. In addition, a referral service for more specialised biochemistry tests is provided.

An on-call service is provided to the hospital only for processing of non-deferrable/urgent test requests.

2. BIOCHEMISTRY TEST INDEX

(For details of tests accredited to ISO: 15189, refer to the Irish National Accreditation Board (INAB) Website scope of accreditation registration number 221MT)

Tests marked with a single asterix* are only available as 'in-house' tests and some are restricted to particular consultants.

Whole Blood / Serum / Plasma:

ABG* (Arterial Blood Gas)
Acetaminophen* (Paracetamol)
AFP (Alpha-fetoprotein)
Albumin
Alcohol* (see Ethanol)
ALP (Alkaline Phosphatase)
ALT (Alanine aminotransferase)
Amylase
ASOT (Anti Streptolysin-O Titre)
AST (Aspartate aminotransferase)
Beta Crosslaps* (CTx)
Bicarbonate
Bilirubin - Total
Bilirubin - Direct (Conjugated Bilirubin)
CA 125
CA 15.3
CA 19.9
Calcium
Cardiac enzymes (CE)
CEA (Carcinoembryonic antigen)
Chloride
Cholesterol
Creatine Kinase (CK)
Creatine Kinase MB isoenzyme (CKMB)
Creatinine
Creatinine - enzymatic
C-Reactive Protein (CRP)
CTx (see Beta Crosslaps)
eGFR
Electrolytes (Sodium, Potassium, Chloride)

Ethanol* (Ethyl Alcohol)
Gamma-GT (Gamma glutamyl transferase)
Gentamicin*
Glucose
HbA1c
HCG
HDL-Cholesterol (HDL)
Lactate*
Lactate dehydrogenase (LDH)
Lipid profile - random
Lipid profile - fasting
Liver function tests (LFTs)
LDL-Cholesterol (LDL)
Magnesium
NTproBNP* (N-terminal pro B-type natriuretic peptide)
Paracetamol* (see Acetaminophen)
Phosphorous
Potassium
Procollagen Type-1 N-terminal Propeptide* (P1NP)
Protein
PTH*
PSA
RF (Rheumatoid Factor)
Salicylate*
Sodium
Triglycerides
Troponin-T (Tn-T)
Urea
Uric acid
Vancomycin*

Urine Test List:

ACR (Albumin:Creatinine Ratio)
Urinary Amylase
Urinary Calcium
Urinary Creatinine
Urinary Creatinine Clearance (see also serum eGFR)
Urinary Drugs of abuse*
Urinary Electrolytes
Urinary Magnesium
Urinary Microalbumin
Urinary Phosphorous
Urinary Protein
Urinary Urea
Urinary Uric Acid

CSF:

CSF glucose*
CSF Protein*

Fluids:

Tests are fluid dependant; contact Biochemistry laboratory for appropriate tests.

Profiles:

The following test profiles are available to requesting doctors.
A limited number of additional profiles (not listed) have been set up for individual consultants for specific investigations within their area of specialisation.

| Profile name | Assays included in profile |
|---------------------|--|
| Bone | Calcium, Phosphorous, Alkaline Phosphatase, albumin, magnesium |
| Cardiac | AST, CK |
| Lipid | Cholesterol, Triglycerides, HDL, LDL |
| Liver | LDH, Gamma-GT, AST, ALT, ALP, Total Bilirubin, Albumin |
| Proteins | Total Protein, Albumin |
| Renal (U+E) | Urea, Creatinine and Electrolytes (Na, K, Cl) |

3. HOURS OF OPERATION AND CONTACT DETAILS

| Postal Address | Hours of Operation | Phone (internal EXT in bold) |
|---|---|---|
| Biochemistry Laboratory MRHT Tullamore Co. Offaly Ireland | Opening hours Monday - Friday 08:00 - 20:00 Routine service 09:00 - 17:00 On call service from 20:00 to 08:00 the following day. On call service provided over 24 hours Sat/Sun/ Public Holidays | Routine hours 057 93 58504 On Call hours via switch EXT 3000 |

| Biochemistry Personnel | Name | Contact Details |
|-------------------------------|----------------------|--|
| Chemical Pathologist | Dr Vivion Crowley | Contactable via the Biochemistry Laboratory |
| Chief Medical Scientist | Ms. Margaret Martin | 057 93 57778 Margareta.martin@hse.ie |
| Senior Medical Scientist | Ms. Karena McRedmond | 057 93 58504 Karena.mcredmond@hse.ie |
| Senior Medical Scientist | Ms. Joan Martyn | 057 93 58504 Joan.martyn@hse.ie |

4. PRE-TESTING INFORMATION

4.1 HANDLING AND TRANSPORT OF SAMPLES

All samples are to be taken into the correct sample containers and transported to the laboratory in the Biochemistry/Haematology Request form specibag during routine hours and in the Biochemistry On-call Request form specibag during on-call hours.

To protect the safety of all healthcare staff, the following precautions for the transportation of samples must be followed:

- The outside of the sample tube must not be contaminated with blood/body fluids.
- Blood or body fluid-stained laboratory request forms must not be submitted.
- Samples must be placed in the plastic bag that is attached to the request form.
- Samples can be transported to the laboratory at room temperature unless otherwise stated in the sample requirements section.

4.2 FORM AND SAMPLE LABELLING REQUIREMENTS

All parts of the General Biochemistry/Haematology Request form or Biochemistry On-call Request form are to be completed in full as per the labelling requirements stated in **Section 7** of the **General Information section** of this manual.

a) Biochemistry/Haematology Request Form (Front of form)

MIDLAND REGIONAL HOSPITAL AT TULLAMORE Tel: 05793 21501 T/SPE/LP/001-01.V02

Patient ID: Specimen requested by consultant or GP name:

Surname: Ward / Report Destination:

Forename(s): Dr Phone / Bleep:

D.O.B: Sex:

Address:

Clinical Details:

Specimen taken and labelled by:

Print Name:

Signature:

Specimen Type:

Specimen Date:

Specimen Time:

Phone / Bleep:

Date / Time Received:

Send by pneumatic chute to 8354 (Laboratory Specimen Reception)

| HAEMATOTOLOGY Ext 58351 | BIOCHEMISTRY Ext 58304 | EXTERNAL REQUESTS Ext 58354 | FOR LAB USE ONLY |
|--|---|--|--|
| <input type="checkbox"/> FBC <input type="checkbox"/> ESR* *Clinical details required for ESR <input type="checkbox"/> PT/INR <input type="checkbox"/> COAG Screen Other Tests Anticoagulant: <input type="checkbox"/> Warfarin <input type="checkbox"/> Heparin <input type="checkbox"/> Argatroban Other (Specify) <input type="text"/> | <input type="checkbox"/> Glucose <input type="checkbox"/> U/E <input type="checkbox"/> CRP <input type="checkbox"/> Troponin-T <input type="checkbox"/> CK <input type="checkbox"/> Liver <input type="checkbox"/> Bone <input type="checkbox"/> Lipid <input type="checkbox"/> Uric Acid <input type="checkbox"/> PSA <input type="checkbox"/> HbA1c | <input type="checkbox"/> Fasting <input type="checkbox"/> 2hrPP <input type="checkbox"/> Random Other Tests <input type="text"/> | Number of Tubes: <input type="text"/> YELLOW <input type="text"/> PINK <input type="text"/> AMBER <input type="text"/> GREEN <input type="text"/> ORANGE <input type="text"/> WHITE <input type="text"/> OTHER <input type="text"/> |

ROUTINE BIOCHEMISTRY • HAEMATOTOLOGY • EXTERNAL REQUEST FORM

PLEASE ENSURE ALL PATIENT DETAILS ARE CORRECT ON THIS FORM AND YOU HAVE LABELLED THE SAMPLES!

PLEASE USE A BALL POINT PEN - PRINT FIRMLY AND CLEARLY


IN HOUSE

b) Biochemistry/Haematology Request Form (Back of form)

General test guidelines are given on the back of the General Biochemistry/Haematology request form.

| HAEMATOLOGY Tel: 057 93 58351 | | BIOCHEMISTRY Tel: 057 93 58504 | | EXTERNAL PLEASE PROVIDE EX HXA SAMPLES Tel: 057 93 58354 | |
|--|---|---|---|---|--|
| 1 EDTA tube (Pink Cap) FBC Retics ESR Infectious Mono. Screen Malaria Screen Platelet clumping: 1 EDTA + 1 ThromboExact Sickle Cell Screen 1 EDTA tube (Pink) and 1 Serum tube (Amber) | 1 Serum tube (Amber Cap) Renal Liver Bone Lipid Cardiac TNT CRP Amylase Uric Acid ASOT RF Tumour Markers Gentamicin Vancomycin Ethanol Salicylate Paracetamol Glucose (Yellow tube) *Lactate (Yellow Cap) *Notify lab and send immediately | ONE AMBER TUBE FOR Mulligan Endocrinology TTT's B12 Folate Ferritin FSH/LH Cortisol Dioxin Iron Studies Oestradiol Progesterone Carbamazepine | ADDITIONAL AMBER TUBE REQUIRED FOR EACH EXTERNAL LABORATORY Mulligan Immunology Auto Abs, SPE, Coeliac, IGE, TPO abs C3, C4, IgG's Virus Reference Lab Hepatitis screen, HIV, CMV, VZV, Measles, Mumps, Toxo <i>Requests for 'tiral screen' must state specific test</i> St James Hospital Testosterone, ENA, Anti CCP, Cardiolipin | | |
| | | COAGULATION Tel: 057 93 58347 1 Citrate tube (Green Cap) PT/INR APTT Fibrinogen D-Dimer | Multiple Samples are required for MRH Mulligan when both Endocrinology and Immunology tests are required MedLab Pathology ANCA, ACE, EPO, Insulin, If abs, IGF-1, Vit D <i>All samples must be received in Laboratory 45 mins prior to dispatch. Transport times are not but may be subject to change. Please contact lab prior to sending urgent samples.</i> | | |
| PLEASE TELEPHONE HAEMATOLOGY BEFORE TAKING MALARIA SCREEN OR SICKLE CELL SCREEN | | PHONE LABORATORY BEFORE TAKING BELOW REQUESTS PTH EDTA (Pink) IGF-1 Homocysteine Vitamin A, B1, B6, C, E, K HbA1c EDTA (Pink) ACTH PCR (specify test) NB Separate EDTA (Pink Cap) samples required for HbA1c, PTH and FBC Contact consultant Haematologist before requesting Factor Assays* or Thrombophilia* screen. Contact the consultant Haematologist or Rheumatologist before taking Lupus* Screen (*Must be received in Laboratory before 12.00pm) | | | |
| For other tests contact lab | For other tests contact lab | PLEASE PHONE LABORATORY IF UNSURE OF SAMPLE REQUIREMENTS | | | |

c) Biochemistry On-Call Request Form (Green Form)




BIOCHEMISTRY ON-CALL REQUEST FORM

BIOCHEMISTRY AT MRH TULLAMORE ON-CALL REQUEST

PLEASE ENSURE ALL PATIENT DETAILS ARE CORRECT ON FORM AND ALL SAMPLE TUBES HAVE YOU LABELLED THE SAMPLES?

Tel: 05793 5 8504

LABOURATORY GLV



EASI OPEN
PATENT No. 007091-1

PLEASE USE A BALL-POINT PEN – PRINT FIRMLY AND CLEARLY

FOR LAB USE ONLY

| | | |
|--|---|---|
| Patient ID: <input style="width: 100%;" type="text"/> | Specimen requested by consultant or GP name <input style="width: 100%;" type="text"/> | FOR LAB USE ONLY |
| Surname <input style="width: 100%;" type="text"/> | Ward / Report Destination <input style="width: 100%;" type="text"/> | |
| Forename(s) <input style="width: 100%;" type="text"/> | Dr Phone / Bleep <input style="width: 100%;" type="text"/> | |
| D.O.B. <input style="width: 100%;" type="text"/> Sex <input style="width: 100%;" type="text"/> | Specimen taken and labelled by: <input style="width: 100%;" type="text"/> | |
| Address <div style="border: 1px solid black; height: 40px; width: 100%;"></div> | Print Name: <input style="width: 100%;" type="text"/> | |
| | Signature: <input style="width: 100%;" type="text"/> | |
| | Specimen Type: <input style="width: 100%;" type="text"/> | |
| | Specimen Date: <input style="width: 100%;" type="text"/> | |
| Clinical Details <input style="width: 100%;" type="text"/> | Specimen Time: <input style="width: 100%;" type="text"/> | Date / Time Received <input style="width: 100%;" type="text"/> |
| | Phone / Bleep: <input style="width: 100%;" type="text"/> | |
| BIOCHEMISTRY ON-CALL TEST REQUESTS | | |
| Send by pneumatic chute to Biochemistry 8504 | | |
| | | FOR LAB USE ONLY Number of Tubes <input style="width: 100%;" type="text"/> YELLOW <input style="width: 100%;" type="text"/> AMBER <input style="width: 100%;" type="text"/> OTHER <input style="width: 100%;" type="text"/> |

All writing on the request form must be clearly legible (block capitals preferred) so that the information provided is legible, thus ensuring proper identification of the patient and all test requests. Writing should be in

ballpoint pen (not marker) to ensure the information is copied through to each sheet of the request form.

Ideally Computer generated labels should be used on the request form (NB. one label is required on each sheet of the request form).

4.3 SAMPLE REQUIREMENTS FOR ROUTINE BIOCHEMISTRY TESTS

ABG (ARTERIAL BLOOD GAS)

Arterial blood taken into an ABG pre-heparinised syringe. These are available on the wards.

- Marquest™ Quick ABG™ sampler – 3ml.
- A second type of sampler, the Westmed Blood Gas sampler – 1mL, is also available in the Intensive Care Unit (ICU).

Special requirements:

The specimen should be air-free and should be analyzed immediately.

Notes / comments:

Blood gas analysers are sited in the Emergency and ICU Departments and also in the Biochemistry laboratory.

Availability of assay: Daily (24 hours for in-house patients).

Reference range (arterial):

| | | |
|--|-------------|--------|
| pH | 7.35 – 7.45 | |
| pCO ₂ (male) | 4.7 – 6.4 | kPa |
| (female) | 4.3 – 6.0 | kPa |
| pO ₂ | 11 – 14 | kPa |
| Ca (Ionised) | 1.15 – 1.27 | mmol/L |
| Anion Gap | 10 – 20 | mmol/L |
| Lactate | 0.5 – 1.3 | mmol/L |
| Base Excess (BEact) | -2.0 - +3.0 | |
| Total CO ₂ (t CO ₂) | 19 – 24 | mmol/L |
| Bicarb (HCO ₃ act) | 21 – 28 | mmol/L |
| Bicarb (HCO ₃ std) | 21– 26 | mmol/L |
| Oxygen saturation | 95 – 99 | % |

Co-oximetry Values:

| | | |
|-----------------------------|-------------|-----------------|
| tHb (male) | 13.5 – 17.5 | g/dL |
| tHb (female) | 12.0 – 16.0 | g/dL |
| OxyHb (FO ₂ Hb): | 94 – 98 | % |
| CarboxyHb: (FCOHb): | <3 | % (non smokers) |
| | <10 | % (smokers) |
| MetHb (FMetHb): | 0.0 – 1.5 | % |
| DeoxyHb (FHHb): | 1.0 – 5.0 | % |

ACETAMINOPHEN (PARACETAMOL)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

Samples should ideally be taken at 4 hours post overdose and preferably not later than 16 hours. Serum values taken at less than 4 hours are difficult to interpret due to the possibility of continuing absorption and distribution of the drug and may not represent the peak level.

Notes / comments:

Early diagnosis of acetaminophen induced toxicity is important since initiation of therapy within 16 hours of ingestion lessens the potential for hepatic damage and decreases the mortality rate.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

Therapeutic range: 10 – 30 mg/L

Toxic range depends on the time of sample post ingestion. Refer to pharmacy guidelines for treatment nomogram in cases of suspected acetaminophen toxicity.

AFP

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request.

Malignancies with elevated levels:

1. Non-seminomatous germ cell tumours (NSGCT) of testis, ovary and other sites.
2. Hepatocellular carcinoma
3. Hepatoblastoma (in children, extremely rare in adults)
4. AFP may be occasionally elevated in patients with other types of advanced adenocarcinomas.

Benign conditions which may have elevated levels include hepatitis, cirrhosis, biliary tract obstruction, alcoholic liver disease, ataxia telangiectasia and hereditary tyrosinaemia. Physiological conditions with elevated levels: pregnancy and the first year of life.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays).

Reference range: 0 – 5.8 U/mL

ALBUMIN

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: Albumin is included in the Liver and Bone test profiles

Availability of assay: Daily, (24 hours for in-house patients).

Reference range: 35 – 52 g/L

ALKALINE PHOSPHATASE (ALP)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

Alkaline Phosphatase refers to a group of phosphatases found in almost every tissue of the body. There are four genotypes: the liver-kidney-bone type, the intestinal type, the placental type and the germ cell variant. Most ALP found in normal adult serum is derived from the liver or biliary tract. Levels are age dependent, with young children and adolescents having much higher levels than adults, due to active bone growth.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: U/L

| Age | Males | Females |
|-------------------|-----------------|-----------------|
| 0 – 5 days | < 231 | < 231 |
| 6 days – 6 months | < 450 | < 450 |
| 7 months – 1 year | < 462 | < 462 |
| 1 – 3 years | < 281 | < 281 |
| 4 – 6 years | < 261 | < 261 |
| 7 – 12 years | < 300 | < 300 |
| 12 – 17 years | 40 – 390 | 35 – 187 |
| Adult | 40 – 129 | 35 – 104 |

ALT (ALANINE AMINOTRANSFERASE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

Most ALT activity is found in the liver, but significant amounts are found in the kidneys, heart, skeletal muscle, pancreas, spleen and lung.

Availability of assay: Daily (24 hours for in-house patients).

ALT is included in the Liver test profile.

Reference range:

Male: < 41 U/L

Female: < 33 U/L

AMYLASE

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: None.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 28 - 100 U/L

ASOT

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

The presence of antibodies to Streptolysin O, an enzyme produced by Lancefield group A beta-haemolytic streptococci, indicates previous infection. Determination is of most use in rheumatic fever and in post-streptococcal acute glomerulonephritis.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range:

| Age | U/mL |
|--------------|-------|
| <6 years | < 150 |
| 6 - 18 years | < 240 |
| Adult | < 200 |

AST (ASPARTATE AMINOTRANSFERASE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

AST is commonly found in many tissue types – heart, liver, skeletal muscle, kidney, brain and red blood cells. Damage to any of these will give rise to elevated AST levels, thus clinical details are important.

Availability of assay: Daily (24 hours for in-house patients).

AST is included in both the Cardiac and the Liver test profiles.

Reference range:

Male: < 40 U/L

Female: < 32 U/L

BETA CROSSLAPS (CTx)

Specimen type / tube:

Plasma / Pink top Sarstedt Monovette (EDTA)

Special requirements:

See Protocol for Testing below.

Protocol for Bone Marker Testing:

- Patients should refrain from exercise for 24hrs
- Patients should fast from midnight
- Patient should relax after arriving for about 30 minutes
- A history of fracture within the last year will affect bone marker levels
- Blood should be drawn between 07:00 and 010:00
- Take one EDTA tube (Pink top)
- Note date and time on sample and form
- Clinical details to include whether pre-therapy (baseline level)
- Beta Crosslaps (bone resorption marker) is repeated at six months post treatment

Notes / comments:

Beta Crosslaps is recommended for monitoring the efficacy of anti-resorptive therapy (e.g. bisphosphonates or HRT) in treatment of osteoporosis, but may be of clinical value in the evaluation of other bone related diseases.

Availability of assay:

The assay has only been sanctioned for patients attending the Osteoporosis clinic. Samples are frozen for batch analysis.

Reference range:

| | | |
|-------------------------|-------------|-------|
| Males: 30 – 50 years | 0.02 – 0.58 | ng/mL |
| 51 – 70 years | 0.10 – 0.70 | ng/mL |
| > 70 years | 0.40 – 0.85 | ng/mL |
| Females: Pre menopausal | 0.03 – 0.57 | ng/mL |
| Post menopausal | 0.31 – 1.00 | ng/mL |

BICARBONATE**Specimen type / tube:**

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
 Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Notes / comments: This assay is also available as part of Blood Gas Analysis.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 22 – 29 mmol/L

BILIRUBIN- TOTAL**Specimen type / tube:**

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
 Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Protect sample from sunlight.

Notes / comments:

Total Bilirubin is included in the Liver profile.

Direct Bilirubin is assayed and reported when the Total Bilirubin is > 28 umol/L

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

| Age | umol/L |
|----------------|--------|
| 0 – 2 days | < 137 |
| 2 – 4 days | <222 |
| 4 – 7 days | <290 |
| > 7 days-17yrs | < 17.0 |
| Adult | <21 |

BILIRUBIN DIRECT

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Protect sample from sunlight.

Notes / comments: Direct Bilirubin is assayed and reported when the total Bilirubin is > 28 umol/L

Availability of assay: Daily (24 hours for in-house patients).

Reference range: < 5.1 umol/L

CA 125

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request.

Notes / comments:

CA 125 is elevated in 80-85% of cases of epithelial ovarian cancer, but is increased in only half of early (stage 1) cancer. It may be elevated in any adenocarcinoma with advanced disease.

Benign conditions which may have elevated levels include endometriosis, acute pancreatitis, cirrhosis, peritonitis, inflammatory pelvic disease. The presence of benign ascites can also give rise to elevated serum levels of CA 125. Physiological conditions with elevated levels include menstruation. Pregnancy may be associated with moderately elevated serum CA 125 (usually not more than 100 U/L). Levels are higher in pre-menopausal women than post-menopausal women.

Main Applications

1. CA 125 should not be used in screening asymptomatic women for sporadic ovarian cancer, but may help differentiate malignant from benign lesions in post-menopausal patients with pelvic masses.
2. The rate of decline during initial therapy is an independent prognostic indicator in ovarian cancer.
3. Monitoring treatment with chemotherapy.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 35 U/mL

CA 15.3

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request.

Notes / comments:

CA 15.3 is elevated in breast and other adenocarcinomas, especially with distant metastases. It is rarely elevated in patients with local breast cancer. It may be elevated in benign liver disease.

The main application of CA 15.3 is for monitoring the treatment of patients with advanced breast cancer.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 25 U/mL

CA 19.9

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request.

Notes / comments:

The main clinical application is as a diagnostic aid for pancreatic carcinoma, however inadequate sensitivity and specificity limit its use in early diagnosis of pancreatic cancer. Also used in monitoring patients with pancreatic adenocarcinoma.

Benign conditions which may have elevated levels include acute and chronic pancreatitis, hepatocellular jaundice, cirrhosis, acute cholangitis and cystic fibrosis.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 35 U/mL

CALCIUM

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

Prolonged venous compression during sampling will increase the calcium result.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 2.15 – 2.55 mmol/L

CARDIAC ENZYMES (CE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

The CE profile includes AST and CK.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: Refer to reference ranges for individual tests

CEA (CARCINOEMBRYONIC ANTIGEN)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request.

Notes / comments:

Can be elevated in almost any advanced adenocarcinoma, but is almost never elevated in early malignancy.

Benign conditions which may have elevated levels include hepatitis, cirrhosis, alcoholic liver disease, obstructive jaundice, ulcerative colitis, Crohn's disease, pancreatitis, bronchitis, emphysema and renal disease. Levels may also be elevated in apparently healthy individuals who smoke.

Main Clinical Application: In surveillance following curative resection of colorectal cancer and in monitoring therapy in advanced colorectal cancer.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: <3.8 ng/mL (non-smokers)

CHLORIDE

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: Chloride is also available as part of the Renal profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 95 – 108 mmol/L

CHOLESTEROL

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

Fasting or non-fasting samples can be used.

Notes / comments: Prolonged venous compression during sampling will increase the cholesterol result.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 5.0 mmol/L (Random or Fasting)

CREATINE KINASE (CK)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

Haemolysis interferes with the assay, resulting in falsely raised values.
CK may be elevated by exercise, intramuscular injections and bruising.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

Male: <190 U/L

Female: <170 U/L

CREATINE KINASE MB (CKMB) AND CKMB%

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

Haemolysis interferes with the assay, resulting in falsely raised values. CKMB is composed of two subunits: CK-M and CK-B. This assay is based on immuno-inhibition of the M subunit, and measurement of activity due to the B subunit. As CKBB is only rarely present in serum, measured B activity is assumed to arise from CKMB. Presence of CKBB in serum will cause a false positive result.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 7 – 25 U/L and < 6% of the total CK

CREATININE

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

Creatinine method: Jaffe alkaline/picrate method.
For icteric samples (when Bilirubin > 170 umol/L) an enzymatic Creatinine assay is performed. Enzymatic Creatinine is also performed on all Creatinine results < 18 umol/L.

Availability of assay: Daily (24 hours for in-house patients).

Reference range (age related):

| Age | umol/L |
|-------------------|----------|
| 0 – 2 months | 21 - 75 |
| 2 months – 1 year | 15 - 37 |
| 1 – 3 years | 21 - 36 |
| 3 – 5 years | 27 - 42 |
| 5 – 7 years | 28 – 52 |
| 7 – 9 years | 35 - 53 |
| 9 – 11 years | 34 – 65 |
| 11 – 13 years | 46 - 70 |
| 13 – 15 years | 50 – 77 |
| Adult male | 62 - 106 |
| Adult female | 44 - 80 |

CREATININE - ENZYMATIC

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

For icteric samples (when Bilirubin > 170 umol/L) an enzymatic Creatinine assay is performed. Enzymatic Creatinine is also performed on all Creatinine results < 18 umol/L.

Availability of assay: Daily (24 hours for in-house patients).

Reference range (age related):

| Age | umol/L |
|-------------------|----------|
| 0 – 2 months | <77 |
| 2 months – 1 year | <34 |
| 1 – 2 years | <31 |
| 3 – 4 years | <37 |
| 5 – 6 years | <42 |
| 7 – 8 years | <47 |
| 9 – 10 years | <56 |
| 11 – 12 years | <60 |
| 13 – 14 years | <68 |
| Adult male | 59 - 104 |
| Adult female | 45 - 84 |

C - REACTIVE PROTEIN (CRP)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

CRP is an acute phase protein to inflammatory reactions. It is also elevated in the presence of infection, infarction and in neoplastic conditions.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: < 5 mg/L

eGFR (ESTIMATED GLOMERULAR FILTRATION RATE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

It should be noted that the equation is only an estimate and **is not validated for use in:**

- Children
- Acute renal failure
- Pregnancy
- Oedematous states
- Muscle wasting diseases
- Amputees
- Malnourished patients

Notes / comments:

An estimated GFR from serum Creatinine is a practical way to identify people with chronic kidney disease (CKD) who might otherwise go untreated, and to monitor those with risk factors for CKD - i.e., diabetes, hypertension, cardiovascular disease, or family history of kidney disease.

$$\text{eGFR} = 175 \times [((\text{serum creatinine}-3.08)/1.004)] \times 0.011312]^{-1.154} \times [\text{age}]^{-0.203} \times [0.742 \text{ if female}]$$

This formula assumes Caucasian ethnicity. **For African - Caribbean patients the eGFR reported by the laboratory should be multiplied by 1.21.** Although the MDRD formula has not been well validated in other racial groups, for example Chinese and other Asian groups, at present there is no evidence to suggest that they are invalid in such groups.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: >90ml/min/1.73m²

Note: The precision and accuracy of eGFR decreases as GFR increases. Therefore, as recommended in the CREST guidelines, eGFR which exceed 60ml/min/1.73m² will be reported as >60ml/min/1.73m².*

Use of eGFR for staging Chronic Kidney Disease:

| Stage | eGFR | Description |
|-------|-------|---|
| 1 | >90 | Normal kidney function |
| 2 | 60-89 | Mildly reduced kidney function / another abnormality |
| 3 | 30-59 | Moderately reduced kidney function |
| 4 | 15-29 | Severely reduced kidney function |
| 5 | <15 | Established renal failure or end stage kidney disease |

ELECTROLYTES (SODIUM, POTASSIUM, CHLORIDE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: Electrolytes (Sodium, Potassium, Chloride) are included in the Renal test profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range (Adult): Refer to individual test for reference ranges.

ETHANOL (ETHYL ALCOHOL)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette or
Plasma / Tube: Yellow top Sarstedt Monovette (Fluoride/oxalate)

Special requirements: None

Notes / comments:

This assay is intended to assist in the clinical management of the patient and is not provided for medico-legal or any other purpose.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

Serum / Plasma: < 10 mg/dL
Signs of intoxication: 50 – 100 mg/dL
Depression of the CNS: > 100 mg/dL
Fatalities reported: > 400 mg/dL

GAMMA-GT (GAMMA GLUTAMYLTRANSFERASE)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: GGT is included in the Liver profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

Male: 10- 71 U/L Female: 6 – 42 U/L

GENTAMICIN

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

A guideline for prescribing and administration of once daily Gentamicin has been drawn up by the antibiotic pharmacist. This is available on all wards. Only a pre-dose (trough) level is required. Wait for the result of the trough level before administering the next dose.

The pre-dose level should be taken at 10:00 on the morning after the first full dose has been administered. Note the time of sample on both the sample and form.

Availability of assay: Daily 9.00- 20.00.

Therapeutic Range for pre-dose level: <1 ug/mL

For information / advice on administration, contact the Antibiotic Pharmacist.

GLUCOSE

Specimen type / tube:

Plasma / Tube: Yellow top Sarstedt Monovette (Fluoride/oxalate)

Special requirements:

Fasting: The patient must abstain from all food or drink (except water) for 8 hours.

2 hour post prandial: Sample must be taken 2 hours after a glucose load.

Oral Glucose Tolerance Test (Non-pregnant):

The patient should be fasting for 8 hours (no food or drink, except for water).

Administer the equivalent of 75 g anhydrous glucose dissolved in water (410 mls of Lucozade may be given).

A fasting sample should be taken immediately prior to administration of glucose load.

A 2-hour postprandial glucose should be taken exactly 2 hours after administration of glucose load.

Record specimen time and state whether fasting, random, post prandial or part of a glucose tolerance test.

Notes / comments:

Glucose will only be reported on serum if the sample is centrifuged and analysed within one hour of phlebotomy.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

| ADA Recommendations | Fasting | 2 hour post prandial | units |
|----------------------------|-----------|----------------------|--------|
| Normal | 3.5-5.6 | 3.5-7.7 | mmol/L |
| Impaired fasting glucose | 5.6 – 6.9 | N/A | mmol/L |
| Impaired glucose tolerance | N/A | 7.8 – 11.0 | mmol/L |
| Diabetes mellitus | >/ = 7.0 | >/= 11.1 | mmol/L |

HbA1c**Specimen type / tube:**

Whole blood / Tube: Pink top Sarstedt Monovette (ETDA)

Notes / comments: The assay is IFCC calibrated.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference range:

IFCC reference range: 20-42 mmol/mol

HCG+β (HUMAN CHORIONIC GONADOTROPIN+β subunit)**Specimen type / tube:**

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Include appropriate clinical details with the request. The assay is available as a tumour marker and not to establish pregnancy.

Main Applications:

1. For monitoring patients with gestational trophoblastic disease (GTD).
2. In conjunction with AFP for determining prognosis and monitoring patients with non-seminomatous germ cell tumours (NSGCT) of testis, ovary and other sites.

Notes / comments: None

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range:

Male : 0 – 2.6 mIU/mL

Female: 0 – 5.3 mIU/mL (non-pregnant pre-menopausal)

HDL-CHOLESTEROL (HDL)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Fasting or non-fasting samples can be used.

Notes / comments:

Abnormal liver function affects lipid metabolism and in some such cases the HDL may be significantly negatively biased. HDL-cholesterol is affected by smoking, exercise, hormones, sex and age.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range:

Male: >1.45 mmol/L

Female: >1.68 mmol/L

Risk factor for CHD

| Sex | No risk | Moderate risk | High risk | Units |
|--------|---------|---------------|-----------|--------|
| Male | > 1.45 | 0.90 – 1.45 | < 0.90 | mmol/L |
| Female | > 1.68 | 1.15 – 1.68 | < 1.15 | mmol/L |

LACTATE

Specimen type / tube:

Plasma / Tube: Yellow top Sarstedt Monovette (Fluoride/oxalate)

Note: Lactate is also available on the blood gas analysers in ED, ICU and the Biochemistry Laboratory.

Special requirements:

Avoid prolonged haemostasis. Notify the Biochemistry laboratory (ext 8504) before the sample is taken. Send the sample to the laboratory immediately as it must be centrifuged within 15 minutes.

Notes / comments:

Lactate increases rapidly with physical exercise. Thirty minutes post exercise should be sufficient for levels to return to normal.

Availability of assay: Daily (24 hours for in-house patients).

Reference range

Venous Plasma: 0.5 – 2.2 mmol/L

LACTATE DEHYDROGENASE (LDH)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: LDH is available as part of the Liver profile.
Haemolysis interferes due to release of LDH from erythrocytes.

Availability of assay: Daily (24 hours for in-house patients).

LDH Reference range (age related):

<20 days 225-600 U/L

21 days -15 years 120-300 U/L

>15 yrs 135-250 U/L

LDL-CHOLESTEROL (LDL)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Fasting or non-fasting samples can be used.

Notes / comments:

For diagnostic purposes LDL-cholesterol levels should always be assessed in conjunction with patient's medical history, clinical examination and other findings.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 3.0 mmol/L

LDL-cholesterol as a risk factor for CHD:

| | LDL | Units |
|---------------|-----------|--------|
| Desirable | < 3.0 | mmol/L |
| Moderate risk | 3.0 – 4.0 | mmol/L |
| High risk | > 4.1 | mmol/L |

LIPID PROFILE

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: The profile includes the following tests: Cholesterol, Triglycerides, HDL, and LDL.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: Refer to individual tests for reference ranges.

LIVER FUNCTION TESTS (LFTS)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments:

The profile includes the following tests:

AST, ALT, GammaGT, LDH, Total Bilirubin, Albumin.

AST and LDH will not be reported on samples > 1 day old.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: Refer to individual tests for reference ranges.

MAGNESIUM

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 0.66 – 1.07 mmol/L

NTproBNP (N-terminal pro B-type natriuretic peptide)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube)

Special requirements:

None

Notes / comments: Appropriate clinical details are required.

Availability of assay: The assay is available by Consultant request only. Samples are stored for batch analysis.

Reference range: Recommended natriuretic peptide cut-off values (pg/mL) for acute heart failure diagnosis

| | NT-Pro-BNP | | | BNP |
|--|-------------------|-----------|----------|------------|
| Age | <50 yrs | 50-75 yrs | >75 yrs | N/A |
| Acute setting, patient with acute dyspnoea | | | | |
| HF unlikely | <300 | | | <100 |
| 'Grey zone' | 300-450 | 300-900 | 300-1800 | 100-400 |
| HF Likely | >450 | >900 | >1800 | >400 |
| Non-acute setting, patient with mild symptoms | | | | |
| HF unlikely | <125 | | | <35 |
| 'Grey zone' | 125-600 | | | 35-150 |
| HF Likely | >600 | | | >150 |

PARACETAMOL

Refer to Acetaminophen

PHOSPHOROUS

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

| Age | Male mmol/L | Female mmol/L |
|---------------|-------------|---------------|
| 1-30 d | 1.25-2.25 | 1.40-2.50 |
| 1-12 months | 1.15-2.15 | 1.20-2.10 |
| 1 - 3 years | 1.00-1.95 | 1.10-1.95 |
| 4 - 6 years | 1.05-1.80 | 1.05-1.80 |
| 7 - 9 years | 0.95-1.75 | 1.00-1.80 |
| 10 -12 years | 1.05-1.85 | 1.05-1.70 |
| 13 - 15 years | 0.95-1.65 | 0.90-1.55 |
| 16 - 18 years | 0.85-1.60 | 0.80-1.55 |
| Adult | 0.81-1.45 | 0.81-1.45 |

POTASSIUM

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

Serum /plasma must be separated from the red cells as soon as possible. Potassium will not be reported on samples > 1day old.

Notes / comments:5

Haemolysis interferes due to potassium release from the erythrocytes.
Potassium is available as part of the Renal profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range:

Serum: 3.5 - 5.3 mmol/L

Plasma: 3.5 - 5.0 mmol/L

PROCOLLAGEN TYPE-1 N-TERMINAL PROPEPTIDE (P1NP)**Specimen type / tube:**

Plasma / Tube: Pink top Sarstedt Monovette (ETDA)

Special requirements: See following Protocol for Testing.

Protocol for Bone Marker Testing:

1. Patients should refrain from exercise for 24hrs
2. Patients should fast from midnight
3. Patient should relax after arriving for about 30 minutes
4. A history of fracture within the last year will affect bone marker levels
5. Blood should be drawn between 07:00 and 10:00
6. Take one EDTA tube (Pink top)
7. Note date and time on sample and form
8. Clinical details to include whether pre-therapy (baseline level)
9. P1NP (bone formation marker) is repeated at six months post treatment

Notes / comments:

P1NP is a specific indicator of type 1 collagen deposition, and is therefore considered a true marker of bone formation. It is not only used in the assessment of osteoporosis but may be of clinical value in the evaluation of other bone related diseases.

Availability of assay:

The assay has only been sanctioned for patients attending the Osteoporosis clinic.

Reference range:

| | | | |
|----------|--------------------------|------|-------|
| Males: | Age 51 - 70 years | < 70 | ng/mL |
| Females: | Pre menopausal | < 60 | ng/mL |
| | Post menopausal (on HRT) | < 60 | ng/mL |
| | Post menopausal (no HRT) | < 76 | ng/mL |

PROTEIN

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements:

Prolonged venous stasis during sample collection will increase the serum protein.

Notes / comments: None.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 66 – 87 g/L

PTH (PARATHYROID HORMONE)

Specimen type / tube:

Plasma / Tube: Pink top Sarstedt Monovette (ETDA)

Special requirements: None.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: 16 – 65 pg/mL

PSA (PROSTATE SPECIFIC ANTIGEN)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube)

Special requirements: None

Notes / comments:

The test is used in conjunction with digital rectal examination as an aid in the detection of prostate cancer. It is also used for monitoring therapy in patients with diagnosed prostatic cancer.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range (age related):**NCCP Guidelines (Caucasian Men)**

| Age (years) | PSA (ng/mL) |
|-------------|-------------|
| 40 – 49 | <2 ng/ml |
| 50 – 59 | <3 ng/ml |
| 60 – 69 | <4 ng/ml |
| >70 | <5 ng/ml |

RF (RHEUMATOID FACTOR)**Specimen type / tube:**

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None.

Notes / comments:

The RF results should always be assessed in conjunction with patient's medical history, clinical examination and other findings.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range: < 20 IU/mL

SALICYLATE**Specimen type / tube:**

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: Peak serum level is achieved 1 – 2 hours post oral administration for therapeutic doses. Salicylate absorption may be delayed when overdose quantities are consumed, especially for enteric coated or slow release preparations. This must be considered when interpreting values for samples obtained earlier than 6 hours after ingestion. Repeat testing is recommended within 2-3 hours to ensure that absorption is complete.

For diagnostic purposes salicylate levels should always be assessed in conjunction with patient's medical history, clinical examination and other findings.

Availability of assay: Daily, (24 hours for in-house patients).

Reference range:

Persons not on salicylate therapy will have no salicylate in their serum.

The therapeutic and toxic ranges are as follows:

Therapeutic range: < 30 mg/dL

Toxic range: > 35 mg/dL adults

SODIUM

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None

Notes / comments: Sodium is available as part of the Renal profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 135 – 145 mmol/L

TRIGLYCERIDE

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: 12 hour fast if fasting triglyceride is required

Notes / comments: None

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range:

Fasting: < 1.7 mmol/L

Random: < 2.3 mmol/L

TROPONIN T High sensitivity (hs TNT)

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: Two samples are required in order to rule in / out a myocardial infarction. One sample on admission and a second 6 hours post admission. The date and time of the suspected cardiac event should accompany the request.

Notes / comments: None.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: < 14 ng/L

UREA

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None.

Notes / comments: Urea is available as part of the renal profile.

Availability of assay: Daily (24 hours for in-house patients).

Reference range: 2.8 – 8.1 mmol/L

URIC ACID

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: None.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00 (Excluding bank holidays)

Reference range:

Male: 202 – 417 umol/L

Female: 143 – 339 umol/L

VANCOMYCIN

Specimen type / tube:

Serum / Tube: Amber top Sarstedt Monovette (Serum gel tube) or
Plasma / Lithium Heparin / Orange top Sarstedt Monovette

Special requirements: A guideline for prescribing and administration of twice daily Vancomycin has been drawn up by the antibiotic pharmacist. This is available on all wards. Only pre-dose (trough) levels are required. Do not delay or omit a dose while waiting for the result of the level.

A pre- dose level should be taken immediately prior to the 10:00 dose on the morning after the third or fourth dose has been administered. Note time of sample on both the sample and the form.

Availability of assay: Daily 9.00 to 20.00.

Therapeutic Range for pre-dose level: 10-20 ug/mL

For information / advice on administration, contact the Antibiotic Pharmacist.

4.4 SAMPLE REQUIREMENTS FOR URINE BIOCHEMISTRY TESTS

ACR (ALBUMIN: CREATININE RATIO)

Specimen type / container: MSU

Special requirements: An early morning urine sample is recommended.

Notes / comments: Urinary Microalbumin and Urinary Creatinine values will also be reported.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range:
< 2.5 mg/mmol

URINARY AMYLASE

Specimen type / container: MSU

Special requirements: None.

Notes / comments: None.

Availability of assay: Daily (24 hours for in-house patients).

Reference Range:
Male: 16-491 U/L, Female: 21-447 U/L

URINARY CALCIUM

Specimen type / container: 24 hr urine collection in container with acid.

Special requirements: A 24 hr urine container with acid is required.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 2.5 – 7.5 mmol/24 hours

URINARY CREATININE

Specimen type / container: 24 hr urine collection in container without acid.

Special requirements: None.

Notes / comments: None.

Availability of assay: Available Monday to Friday 9.00 to 20.00.

Reference Range:
Male: 9 – 21 mmol/24 hours, Female: 7 – 14 mmol/24 hours

URINARY CREATININE CLEARANCE

Specimen type / container:

24 hr urine collection in container without acid

Serum from a Sarstedt Monovette® Amber Tube taken during the urine collection period.

Special requirements: Both a serum sample and a 24 hour urine collection are required to calculate the Creatinine Clearance.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 71 – 151 ml/min

URINARY DRUGS OF ABUSE*

Specimen type / container: MSU

Special requirements: Urine Drugs of Abuse testing is only available as an in-house assay.

Notes / comments:

This screening test is intended to assist in the clinical management of the patient and is not provided for medico-legal or any other purpose. The kit insert outlining the urinary metabolites measured will be attached to each report.

Availability of assay: Daily (24 hours for in-house patients).

Reference Range: Negative.

URINARY ELECTROLYTES (Sodium, Potassium, Chloride)

Specimen type / container: 24 hr urine collection in container without acid.

Special requirements: None.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range:

| | | | |
|--------------------|---------|-----------|-------------|
| Urinary Sodium | Male: | 40 – 220 | mmol/24 hrs |
| | Female: | 27 – 287 | mmol/24hrs |
| Urinary Potassium: | | 25 – 125 | mmol/24 hrs |
| Urinary Chloride: | | 110 – 250 | mmol/24 hrs |

URINARY MAGNESIUM

Specimen type / container: 24 hr urine collection in container without acid.

Special requirements: None.

Notes / comments: None

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 3.0 – 5.0 mmol/24 hours

URINARY MICROALBUMIN

Specimen type / container: MSU

Special requirements: An early morning urine sample is recommended.

Notes / comments: An ACR will also be reported.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: < 20 mg/L

URINARY PHOSPHOROUS

Specimen type / container: 24 hr urine collection in container with acid.

Special requirements: A 24 hr urine collection in container with acid is required.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 13 – 42 mmol/24 hours

URINARY PROTEIN

Specimen type / container: MSU or 24 hr urine collection in container without acid.

Special requirements: None.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: <0.14 g/24 hours); MSU: < 0.15 g/L

URINARY UREA

Specimen type / container: 24 hr urine collection in container without acid

Special requirements: None.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 428 – 714 mmol/24 hours

URINARY URIC ACID

Specimen type / container: 24 hr urine collection in container without acid

Special requirements: Do not refrigerate.

Notes / comments: None.

Availability of assay: Monday to Friday 9.00 to 20.00.

Reference Range: 1200 – 5900 umol/24 hours

4.5 SAMPLE REQUIREMENTS FOR CSF BIOCHEMISTRY TESTS

CSF GLUCOSE

Specimen type / container: CSF containers are available from the Microbiology Department.

Special requirements: All CSF samples are sent to the Microbiology Department for initial examination. Aliquots are then sent to the Biochemistry Department by Microbiology staff for analysis of CSF glucose and protein.

Notes / comments: Appropriate clinical details are required.

Availability of assay: Daily (24 hours for in-house patients).

Reference Range:

Adult: 2.2 – 3.9 mmol/L (Fasting)

Infant/Child: 3.3 – 4.4 mmol/L

Results should be interpreted in conjunction with the plasma glucose. CSF glucose should be 60 – 70% of the plasma glucose.

CSF PROTEIN

Specimen type / container: CSF containers are available from the Microbiology Department.

Special requirements:

All CSF samples are sent to the Microbiology Department for initial examination. Aliquots are then sent to the Biochemistry Department by Microbiology staff for analysis of CSF glucose and protein.

Notes / comments: Appropriate clinical details are required.

Availability of assay: Daily (24 hours for in-house patients).

Reference Range: 15 – 45 mg/dL

5. BIOCHEMISTRY TEST TURNAROUND TIMES

Time indicated is from receipt in the laboratory to result reporting and are average turnaround times. The times indicated do not take into account cases where testing of samples needs to be repeated for technical or quality control reasons.

| Test Name/Profile | Routine | Priority | Critical |
|--|---------|----------|----------|
| Routine Biochemistry (in-house patients) e.g. Renal/Liver/Bone | 3 hrs | 2 hrs | 1 hr |
| Troponin T | 3 hrs | 2 hrs | 1 hr |
| Gentamicin/Vancomycin | 3 hrs | 2 hrs | N/A |
| GP Samples* | 6 hrs | 3 hrs | N/A |
| Tumour Markers* | 6 hrs | N/A | N/A |
| HbA1c* | 6 hrs | N/A | N/A |

* available Monday to Friday 9.00- 20.00 (excluding bank holidays)

6. SAMPLE RETENTION

| Sample | Retention Time |
|---|----------------|
| Serum/Plasma/EDTA/Urine Sample Bottles | 3 days |

7. QUALITY ASSURANCE

The Biochemistry Laboratory Participates in the following External Quality Assurance Schemes.

| Distributor | QA Programme |
|--------------------|---|
| UKNEQAS | 1. HbA1C 2. Cardiac |
| BIO-RAD | 1. Immunoassay EQAS 2. Clinical Chemistry EQAS |
| RIQAS | 1. Human Urine Programme 2. Specific Proteins Programme 3. Clinical Chemistry Programme 4. Therapeutic Drugs Programme 5. Blood Gas Programme 6. Ethanol Programme 7. Cardiac Programme 8. Co-Oximetry Programme |
| IEQAS (Labquality) | 1. Urine Drugs of Abuse |

BLOOD BANK



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7. SAMPLE RETENTION**8. QUALITY ASSURANCE**

1. INTRODUCTION

- The Blood Bank at Midland Regional Hospital, Tullamore provides a routine Blood Transfusion Service to the hospital and to general practitioners in the local area (special circumstances only).
- An Emergency out-of-routine-hours On-Call Service is also provided by the Blood Bank.
- Errors in transfusion are well documented in literature and are preventable, provided they are reported and properly analysed at the earliest. Haemovigilance programs from around the world document that the greatest risk to recipients of blood transfusion is human error, resulting in transfusion of the incorrect blood component. Inadequate patient identification or sample labelling can result in mismatch transfusions (ABO-incompatible transfusions). Errors made in the collection of the patient sample for pre-transfusion compatibility testing are serious, because they are at the beginning of a complex chain of events in the process of clinical transfusion. Therefore, strict adherence to sample collection and labelling criteria for transfusion is essential.
- The Quality and Traceability of Blood and Blood Transfusion Practice is governed by EU Blood Directives (2002/98/EC), (2004/33/EC) and (2005/61/EC) which have been enacted into Irish Legislation (SI 360/2005 and SI 547/2006). The Blood Transfusion Laboratory is also committed to the safe supply of medicines to patients which is governed by the EU Falsified Medicines Directive (2011/62/EU).
- The Blood Bank at MRHT is accredited to ISO 15189

Blood Transfusion Guidelines are available in the relevant clinical areas.

We advocate the use of the Electronic BloodTrack System (EBTS) for labelling BT samples.

2. BLOOD BANK TEST INDEX

For details of tests accredited to ISO: 15189, refer to the Irish National Accreditation Board (INAB) Website scope of accreditation registration number 221MT)

- Blood Group
- Antibody Screen
- Crossmatch
- Direct Antiglobulin Test (DAT)/Direct Coombs Test (DCT)
- Antibody Identification
- Transfusion Reaction Investigation
- Patient and Donor Unit Phenotyping

Other tests sent to National Blood Centre (NBC) - Irish Blood Transfusion Service (IBTS) include

- Investigation of rare blood groups/subgroups
- Investigation of Allo and Auto antibodies
- Investigation of Cold antibodies
- Compatibility testing for patient with allo/auto/cold antibodies and provision of antigen negative blood
- Molecular genotyping for pre-transfusion work-up of patients commencing Daratumumab treatment
- Compatibility testing for patients on Daratumumab
- Elution studies for Positive DAT Post Transfusion Reaction Sample
- Culture of blood bags post suspected Bacterial Transfusion Reactions
- HLA typing for potential transplant patients
- Disease association tissue typing
- Leucocyte antibodies
- Platelet antibodies
- Weak D Genotyping
- Extended RBC Genotyping
- Molecular Investigation for other Blood Groups

Refer to External Tests Section for more information

3. HOURS OF OPERATION AND CONTACT DETAILS

| Postal Address | Hours of Operation | Phone (internal EXT in bold) | Fax |
|---|---|---|-------------|
| Blood Bank MRHT Tullamore Co Offaly Ireland | <ul style="list-style-type: none"> Monday – Friday 08:00 - 20:00 On call service from 20:00 to 08:00 the following day. Sat/Sun/Public Holidays-On call service provided over 24 hours | 057-93 58385 or 057-93 58387 Contact via switchboard Ext.3000 | 057-9359395 |

| Blood Bank Personnel | Name | Contact Details |
|----------------------------------|--|--|
| Consultant Haematologist | Dr. Gerard Crotty | 057-93 58352 (Secretary) or via switchboard Ext. 3000 Gerard.crotty@hse.ie |
| Consultant Haematologist | Dr. Kanthi Perera | 057-93 59250 (Secretary) or via switchboard Ext. 3000 Meegahage.perera@hse.ie |
| | Haematology Medical team | Contact via switchboard Ext. 3000 |
| Chief Medical Scientist | Ms. Bernie Weston | 057-93 58384/58385 |
| Senior Medical Scientist Quality | Ms. Michelle Dunne | 057-93 58385/57783 |
| Transfusion Surveillance Officer | Ms. Denise Murphy/ Ms Aisling Sweeney | 057-93 58350 or Bleep 290 |
| General Enquires | | |
| Blood Bank Staff | Blood Bank Requests | 057-93 58385/ 057-9358387 |
| On Call staff | For Haematology and Blood Bank requests on-call | Contact via switchboard Ext. 3000 |

4. GENERAL INFORMATION

4.1 PREFERRED SAMPLE

- The preferred sample for Blood Transfusion testing is whole blood collected in a 7.5ml EDTA sample tube.
- Confirm Group samples should be taken into the specially labelled 2.7ml EDTA sample tube.
- Clotted samples may be acceptable for some testing e.g. post transfusion reaction sample to aid in the identification of weak antibodies and will be considered on a case by case basis.
- Samples should be sent to the laboratory as soon as possible and never refrigerated in the clinical area.
- Samples taken >24 hours before receipt in the BT Lab will be rejected.

4.2 SAMPLE VOLUME

For optimal sample volumes refer to the following table. These volumes should be adhered to where possible, but if collection is particularly difficult, contact the Blood Bank for advice on the minimum volumes required.

| Test Name | Short name | Sample type | Sample volume(ml) | Turn Around Time |
|--|------------|---------------------|-------------------|-----------------------------|
| Blood Group/Antibody screen or Cross match | G/S or X/M | EDTA | 7.5 | 8 hours |
| Confirm Blood Group | | EDTA | 2.7 | 8 hours |
| Direct Antiglobulin Test/Direct Coombs Test | DAT/DCT | EDTA | 2.7/7.5 | 8 hours |
| Antibody Identification | Ab Id | EDTA | 2x 7.5 | 24hrs or sent to NBC - IBTS |
| Request for Platelets/Other products ordered from IBTS | | EDTA | 7.5 | Min 3 hours |
| Transfusion Reaction Investigation | Tx Rxn | EDTA And/or Clotted | 7.5 7.5 | 8 hours |
| Auto immune Haemolytic Anaemia | AIHA | EDTA | 2X7.5 | 24hrs or sent to NBC - IBTS |

| | | | | |
|--|--|------|---|-----------------------------|
| Weak D Genotyping Extended RBC Genotyping Molecular Investigation for other Blood Groups | | EDTA | ≥ 3ml (Note samples MUST be stored at Room Temperature) | 2 weeks Sent to IBTS |
|--|--|------|---|-----------------------------|

**Note: Group & Hold = Group & Antibody Screen
Paediatric samples for Blood Transfusion testing:**

- At least 2ml of blood in a 2.7ml EDTA bottle is required.
- Small 1.3ml paediatric bottles are unsuitable because the label on the bottle has insufficient space for the details required.

4.3 TURN AROUND-TIME (TAT)

- **Cut-off time for same day reporting:**
Arrival in the Blood Bank before 16:30.
- **Patient samples with complex antibodies may not be completed on the same day.**
- Estimated turn-around-times for testing are recorded in Section 4.2. See Section 5.7 for emergency situations.
- Testing may be completed earlier than the times stated. On some occasions however, it could take longer, depending on the complexity of the work undertaken.
- The Blood Bank at MRHT and the IBTS Diagnostic Laboratory may perform extra testing as a follow-up to preliminary results e.g. positive DAT, antibody identification on samples with positive antibody screen.

4.4 VALIDITY OF TRANSFUSION SAMPLES

- All BT samples are valid for **72 hours** from the time the sample was taken.
- All blood crossmatched on this sample must have the transfusion completed within 72 hours of the sample being taken.
- After this time if the patient has not commenced transfusion or if additional test/transfusion is requested then a new sample will be required.

4.5 ADDITIONAL TESTING

- All BT samples are valid for 72hours from the time the sample was taken e.g. group and screen.
- The original samples are held by the Blood Bank for 72 hours during which they are available for any additional patient requirements e.g. add crossmatched red cells request to sample previously sent for group and screen only.
- Platelets and other products may be requested during this 72-hour period also.
- DATs may be performed on samples <24 hours old.
- Additional test requests should be made using the "Additional Test/Additional Component Orders Form" (T/BTL/RC/009-03) found at the Nurses Station in the Clinical Area
- **PLEASE PHONE THE BLOOD BANK TO DETERMINE SAMPLE VALIDITY IF NECESSARY.**

4.6 Confirm Group Requirements

- Confirm Group Sample will be required for all patients requiring blood/blood products who present with no previous Blood Transfusion history in this hospital and their sample is handwritten.
- **The confirm sample must be taken from the patient in a separate draw.** This is to prevent an incompatible transfusion due to a wrong blood in tube error.
- If the sample was collected using the Personal Digital Assistant (PDA) BloodTrack System, then a confirm group will **NOT** be required **EXCEPT** in cases where the PDA label is the only form of demographics on the request form (i.e. there is no addressograph label/handwritten details on the form).
- Where a confirm group sample is required a specific **Confirm Sample Pack** will be sent by the Blood Transfusion laboratory staff to the clinical area if blood/blood products are required. On receipt of the confirm sample, the blood/blood products can be released providing the patient's blood group is confirmed as being the same as the initial sample.
- In an emergency situation where transfusion is required before the confirm sample is received or there is insufficient time to collect a confirm sample,

the laboratory will issue uncrossmatched group O red cells, group A/B platelets and group AB Plasma.

- Issue of suitable products will not be delayed due to the requirement of a confirmatory sample.

4.7 PATIENTS PRESENTING WITH ANTIBODIES FOR ELECTIVE PROCEDURES

- For all patients presenting with antibodies for surgery it is the policy of the blood bank to have 2 units of blood (antigen negative or considered suitable) available for the patient. A written request for blood should still be sent to the Blood Transfusion Laboratory.
- Patient samples with antibodies identified at pre-op assessment will have a Blood Transfusion alert label on their report form. Pre op assessment staff are responsible for liaising with admissions re these alerts and informing laboratory staff of admissions to prevent possible delays in transfusion.
- Patient samples with antibodies will require extra testing by the laboratory (1 working day). For patient samples with complex antibodies referral to the reference laboratory – NBC (IBTS), for further investigation (1 to 3 working days) may be required. This may involve additional testing of donor units, call up of specialist donors or sourcing of blood from international stocks at the IBTS.

Important

- 1. Patients with known antibodies:** should have a blood transfusion sample sent the day prior to surgery and should be placed at the end of the theatre list to allow for adequate time to resolve antibody identification and the provision of the relevant antigen negative blood.
- 2. Patients with complex antibodies requiring referral to external laboratory:** the relevant team should contact the laboratory at least one week prior to surgery to organise for samples to be sent to the referral laboratory NBC (IBTS) in order to have adequate antigen negative blood available prior to surgery.

- Please be aware that Emergency O Neg is suitable for an emergency situation where the antibody status is unknown, but should not be considered a universal donor for patients with antibodies.
- If the Blood Bank is unable to provide compatible/suitable blood for a patient with an antibody, this will be communicated to the patients care team.
- If a patient with an antibody has no blood available and is taken to theatre for an elective procedure following communication from the Blood Bank, any unexpected event will be the responsibility of the patient care team.

4.8 CLINICAL ADVICE

- Advice on transfusion support and management of patients or interpretation of test results can be obtained from the Consultant Haematologist. Refer to Section 3 for contact details.
- Clinical information on blood transfusion is available in the clinical areas in relevant guidelines.

4.9 TECHNICAL ADVICE

- Advice on sample requirements and test procedures can be obtained from the Blood Bank.
- Senior Medical Scientific staff in Blood Bank are authorised to give advice on scientific information such as the use of laboratory results or data. Refer to Section 3 for contact details.

4.10 TRANSFUSION SURVEILLANCE/HAEMOVIGILANCE

- It is the responsibility of the Transfusion Surveillance Officer (TSO) to investigate unexpected or undesirable effects of transfusion of blood components/products and report them to relevant personnel and authorities in a timely manner. This includes investigation of Wrong Blood in Tube events.
- The TSO is also responsible for the development of guidelines for transfusion practise and provision of education for portering, medical and nursing staff

relating to current transfusion practice. This includes training for use of BloodTrack devices and provision of access to the system.

- Other functions of haemovigilance include traceability of blood components, auditing transfusion practice, transfusion look back and recalls as requested by the IBTS. The TSO provides clinical advice under the direction of the Consultant Haematologist.
- Refer to section 3.0 for contact details.

5.0 PRE TRANSFUSION TESTING INFORMATION

- **IMPORTANT:** It is not possible to over-emphasise the importance of proper patient identification. Most errors relating to transfusion practice arise from administrative and clerical error. These errors can have serious consequences for patients and are sometimes fatal.
- DAT requests/Samples received with the General Haematology/ Coagulation/ Biochemistry/ External Request Form will not be accepted in Blood Transfusion. An appropriately labelled 2.7ml/7.5ml EDTA sample with an appropriately labelled BT request form is required.

5.1 COMPLETION OF THE REQUEST FORM

The MRHT "Blood Transfusion Request Form" is used for ordering tests, blood components and factor concentrates. See T/HVBT/GL/001 "Guideline for Sample Labelling and Completion of the Request Form for Blood Transfusion" for further information.

The above request form is document controlled and subject to change.

- Full and accurate completion of the request form is essential for ensuring that the right test or quantity of blood component or product is available at the right place at the right time.
- Patient details are to be recorded on the form using legible handwriting or a large computer generated addressograph label.
- Please refrain from using a PDA label as the patient identifier on the request form; addressograph labels/handwritten patient details are preferred.

The request form **MUST** contain the following patient information

1. Patient Identification Number (chart number)
2. Patient's surname and First name/s (unabbreviated)
3. Date of birth
4. Gender
5. Date test result/blood required for (Mandatory for Elective Surgery)

AND SHOULD CONTAIN

6. Patient address
7. Ward
8. Consultants Name
9. Clinical details
10. Reason for Transfusion
11. Previous Blood Group (if known)
12. Previous transfusion history (NB for transfused or pregnant in the last 3 months)

13. Test required
14. The number and type of blood products required
15. Special Requirements (e.g. CMV negative, irradiated) requests are the responsibility of person requesting the test. (see point 5.2)
16. Time/Date test is required

IN ADDITION

17. The form must be signed and dated by the person requesting the test (include bleep number) and should contain their MRCN/NMBI.
18. The form must be signed and dated by the person who took the sample (include bleep number) and should contain their MRCN/NMBI, this can be done in written format (legible) or by using a BloodTrack PDA label. Where the PDA is used for sample labelling the MRCN/NMBI is not required as the user is identifiable on the PDA label generated by the BloodTrack system.

5.2 SPECIAL REQUIREMENTS (CMV Negative & Irradiated)

The following is the current guideline at time of release but is subject to change - See T/HVBT/GL/011 "Guideline for the use of Cytomegalovirus (CMV) Negative and Irradiated Blood Components" for the latest information.

Special requirements are defined here as **Cytomegalovirus (CMV) negative** and/ or gamma irradiated blood components.

Note: **In emergency situations** where the risk of withholding a transfusion would adversely affect the outcome for the patient, special transfusion requirements may need to be overridden ideally following discussion with a Haematologist.

CMV is only transmitted by cellular components i.e. RCC or platelet transfusions and CMV negative components is recommended as outlined in Table below.

NOTE WHERE CMV STATUS IS UNKNOWN; ASSUME THE PATIENT IS CMV NEGATIVE

INDICATIONS FOR CYTOMEGALOVIRUS (CMV) NEGATIVE BLOOD COMPONENTS

| |
|--|
| Potential recipients of ALLOGENEIC HSCT - (e.g. Acute Myeloid Leukaemia, Hodgkin's disease, possibly Non Hodgkin's Disease - for additional clarification contact Haematology team) |
| Post ALLOGENEIC HSCT where the donor is also CMV negative |
| |
| In Pregnancy (Antenatally) |
| Intrauterine Transfusion and neonates up to 28 days post expected date of delivery |
| All Haematology / Oncology children (shared care with Our Lady's Children Hospital Crumlin) |

Gamma Irradiated blood components

- Certain groups of patients are at risk of developing Transfusion Associated Graft-versus-Host Disease (TA-GVHD) if given red cells or platelets. Treatment of blood components with 30Gy gamma irradiation kills any remaining lymphocytes in these products, which might otherwise cause TA-GVHD in susceptible patients.
- Gamma Irradiated blood components are recommended for specific patient groups as outlined in table below.

| INDICATIONS FOR IRRADIATED BLOOD COMPONENTS |
|---|
| All recipients of Haemopoietic Stem Cell Transplants (HSCT) either ALLOGENEIC OR AUTOLOGOUS from time of initiation of conditioning chemo/radiotherapy and continued while patient receives GvHD prophylaxis (usually six months' post-transplant or until CD4 count $>200 \times 10^9/l$ whichever is first) |
| If chronic GvHD is present or if continued immunosuppressive treatment is required, irradiated blood components should be given indefinitely |
| Donors of allogeneic marrow 7 days prior to or during harvest |
| Donors awaiting autologous stem cell harvesting 7 days prior to or during harvest |
| Patients with Hodgkin's disease - <i>lifelong requirement</i> |
| |

SPECIFIC CHEMOTHERAPY

- All patients receiving immunosuppressive therapy with **anti-thymocyte globulin (ATG)** e.g. Aplastic Anaemia – usually for six months' post treatment or until CD4 count $>200 \times 10^9/l$ whichever is first
 - Patients who received specific **purine analogue therapies*** - *lifelong requirement* e.g. Fludarabine, Pentostatin (Deoxycoformicin), Cladribine, Clofarabine, Bendamustine
 - Patients receiving **alemtuzumab (anti-CD52)** usually six months' post treatment or until CD4 count $>200 \times 10^9/l$ whichever is first
- Note - not required for rituximab

All Granulocyte transfusions

All adults & children who are to receive blood donations from first and second degree relatives

Intra-uterine & subsequent transfusions up to 6 months after expected delivery date (40 weeks gestation)

Exchange transfusions of the newborn

All Suspected and confirmed severe T Lymphocyte immunodeficiency syndromes. See T/HVBT/GL/011 "Guideline for the use of Cytomegalovirus (CMV) Negative and Irradiated Blood Components"

All Haematology /Oncology children (shared care with Our Lady's Children Hospital Crumlin)

*** Purine analogue therapies - note this list is subject to change and is not exhaustive. Indication for irradiated components is extended to newer purine analogues until evidence of their safety is established – for additional clarification contact Haematology team.**

5.3 SAMPLE COLLECTION

- **Only one patient is bled at a time to minimize the risk of error.**
- If the patient is not wearing a hospital identity band (ID band), blood must not be taken until one is applied. This is not required if sample is for group and screen of an outpatient e.g. maternity outpatient instead the patient should be asked to state and spell (if able) their surname, first name(s) and date of birth.

- If at any stage the ID band is removed e.g. for cannulation, then it is the responsibility of the person who removed it to re-apply a new ID band immediately.
- **ENSURE PATIENT IS WEARING THE CORRECT ID BAND - CHECK PATIENT IDENTIFICATION NUMBER (CHART NUMBER) IN CASE OF TRANSFER FROM ANOTHER HOSPITAL**
- Check expiry date of sample bottle before collecting the sample.
- The patient's identity must be re-established if the collector leaves the patient's location prior to initiating the sample collection procedure.
- It is recommended where possible to take the sample from an alternative limb to the one where fluids are infusing. Where the sample must be taken from the same limb, stopping the infusion before taking the sample and choosing a vein distal to the infusion is recommended.
- Blood samples must not be obtained from the tubing of an intravenous set or drawn from a vein in which an intravenous solution is being infused.

Blood Collection Using the BloodTrack System

- BloodTrack is fully integrated with the blood transfusion laboratory's electronic transfusion management system.
- The *collect samples* module is used when collecting a BT blood sample.
- **To use the system, the patient must be wearing an electronic wristband with name, date of birth and chart number recorded in both a 2D barcode and eye readable format.** This provides positive patient identification by reading directly from the 2D barcode on the patient's wristband every time a blood sample is taken.
- The ID cards of staff members trained in sample collection contain their user ID (electronic signature) - **hence ID cards MUST never be loaned to another person.**
- For further details on Patient Identification and Specimen Collection for Blood Transfusion refer to: **T/HVBT/GL/001** "*Guideline for Sample Labelling and Completion of the Request form for Blood Transfusion*" **(available in the clinical areas).**
- For training on BT sampling or access to use BloodTrack contact the Transfusion Surveillance Officer or Blood Bank refer to section 3.0 for contact details.

5.4 SAMPLE LABELLING

IMPORTANT:

- Sample tubes must not be labelled in advance of sample collection and must be accurately labelled BEFORE leaving the patient.
- DO NOT copy patient details from the patient's notes or charts, copy from the patient ID band once verified that it is correct.
- DO NOT apply a computer generated label/addressograph label to the sample.
- Check the expiry date of the sample tube.
- **NOTE- IF SAMPLE IS TAKEN USING THE PDA SYSTEM- DO NOT ADD ANY OTHER ADDRESSOGRAPH LABEL TO THE SAMPLE BOTTLE**
- **Evidence of any other type of labelling or interference with the sample label will result in REJECTION of the sample.**

Either a BloodTrack PDA generated label or legible hand written sample are acceptable.

Details **must** include:

- Patient Identification Number (chart number)
- Patient's surname and first name/s (unabbreviated)
- Date of Birth
- Signature or initials of the collector

In addition, date and time of collection should be included where possible.

Following sample labelling, ensure that the request form and the sample tube have identical patient information.

5.5 HANDLING AND TRANSPORT OF SAMPLES

To protect the safety of all healthcare staff the following precautions for the transportation of samples must be followed:

- The outside of the sample tube must not be contaminated with blood.
- Blood-stained laboratory request forms must not be submitted.
- Samples must be placed in the plastic bag that is attached to the request form.
- Samples can be transported to the laboratory at room temperature.
- Samples can be transported in a red carrier in the hospital chute system to Blood Transfusion. Destination number- (8385 routine hours and 8351 on call hours)

5.6 SAMPLE REJECTION/SAMPLE AMENDMENTS

TO PREVENT SAMPLE REJECTION, WE ENCOURAGE THE USE OF BLOODTRACK TX

Blood Bank staff are only authorised to accept samples which meet the required standard.

If labelling requirements are not met, the Blood Bank will do the following:

- In the case of minor discrepancies, Blood Bank staff may contact the person who collected the blood sample and request that they correct the error.
- If the collector is unavailable, or in the case of major discrepancies, Blood Bank staff will request a new sample and request form. The original sample will be discarded.

Samples **will** be rejected in the following circumstances and new request forms and samples will be requested.

1. Unlabelled form
2. Unlabelled sample
3. No Patient Identification Number (chart number) on sample/form
4. Sample labelled with computer generated label (Blood Track PDA generated label is the only label accepted on BT samples)
5. No forename on the sample/form
6. No surname on the sample/form
7. Incorrect spelling or very misspelled surname on the sample/form
8. No DOB on the sample/form
9. Incorrect DOB, more than one date
10. No signature on the sample of the person who took the sample

11. Sample unsuitable *e.g.* gross haemolysis
12. Sample showing evidence of breakage or leaking
13. Sample insufficient volume (dependent on test requests)
14. Sample greater than 24 hours old
15. Incorrect sample type
16. Expired sample bottle
17. Evidence of non-PDA label on sample bottle/other labelling/interference with label

The patient care area will be informed if the sample is rejected. If the request is urgent the requesting practitioner will be informed directly. A report form, informing of the sample rejection will also be sent to the requesting area.

In a critical situation, emergency group O Rh (D) negative red cells can be issued until a new sample is received, testing is complete and compatible blood can be provided.

Where a dispute arises in relation to a sample, the final decision on suitability for testing will lie with the Consultant Haematologist or Chief Medical Scientist.

5.7 EMERGENCY SITUATIONS INCLUDING SAMPLING

Critical Samples (life or death situation)

- For all critical samples the ward must phone the laboratory in advance to inform them that a critical sample is being sent and must be processed immediately.
- The person requesting the test may write "critical" on the request form if they wish. The sample can be delivered by chute or by hand.

Urgent Blood Transfusion specimens during routine hours:

- During routine laboratory hours please telephone urgent requests to ensure priority processing and to ensure Group & Screen results are available for patients going to theatre.

Urgent Blood Transfusion specimens out of hours:

- The Medical Scientist on call **MUST** be contacted for **all Blood Transfusion specimens out of normal working hours**. The

Medical Scientist on call can be contacted through the switch board (**Ext. 3000**).

Sample labelling for unidentifiable patients:

- For an unidentifiable/unconscious patient, whose identity cannot be established, two identifiers are mandatory for completion of the Blood Transfusion Request Form and labelling of the sample tube.
- These are
 - a) Patient Identification Number (chart number)
 - b) Patient Gender (*e.g.* unknown male or unknown female).
- The sample is labelled with date, time sample taken, signature of the sample collector and bleep number if applicable.
- **Where possible, every effort should be made to take a sample from the patient prior to transfusion of any emergency O Rh (D) Negative blood.**
- As more information regarding patient identity becomes available, the Blood Bank must be informed and a new sample, fully labelled, should be sent to the Blood Bank for retrospective checks, once the patient is stabilised.

Urgent Requirement for Blood Components.

- If the need for blood components is urgent, notify the Blood Bank by telephone.
- The following information will be required:
 - Patient's identification number (chart number) the same as supplied on the sample and form.
 - Patient's location.
 - Number and type of components/products required.
 - Name of person requesting the components/products
- In emergency situations a Telephone Request is acceptable but should be followed up with an Additional Test/Additional Component Orders Form when time permits.

- In an emergency, full compatibility testing may not be able to be performed before the issue of blood. Two Group O Rh (D) negative red cell units are available for immediate issue in the blood issue fridge.
- There is still a **requirement** to submit a **sample for testing** as soon as possible.
- **As a guide** the following timescale applies – for one patient only assuming a confirm sample is NOT required.

| Time interval (guide) | Tests Completed | Units Supplied (2- 6 units max) |
|-----------------------|---|--|
| 0 – 10 mins | None | Emergency O Rh (D) Negative blood |
| 10 –30 mins | Blood Grouping only | ABO and Rh (D) Group compatible uncrossmatched blood. |
| 45 mins | Blood Group and Antibody Screen -Antibody screen negative | ABO and Rh (D) group compatible crossmatched blood. |
| >45 mins | Blood Group and Antibody Screen - Antibody screen positive | ABO and Rh (D) group compatible crossmatched. This will depend on the antibody identified and the availability of compatible units. |
| 40 mins | Issue of Plasma | Issue of max 4 Group compatible LG-Octaplas Units. |
| 2-3 hours | Issue of Platelets | Order, delivery and issue of platelets from IBTS. |
| 0-10 min | Issue of coagulation factors e.g. Fibrinogen | Issue of the required dose of coagulation factors requested. |

Emergency O Rh (D) Negative units will be issued with compatibility labels and compatibility reports stating **"Uncrossmatched blood, Group, Rh and Kell checked. Note: O Positive RCC and other Blood Products can be issued on this number as required"**

Emergency O Rh (D) negative blood should not be used for elective and/or non-critical patients with red cell antibodies, as these units are not typed for all antigens.

5.8 GP REQUESTS FOR BLOOD GROUPS

- The Blood Bank routinely processes hospital transfusion samples only.
- The Blood Bank is unable to process samples from GP surgeries, except for urgent medical reasons. Contact the Blood Bank in advance.
- A hard copy of the report will be sent to the GP only.
- Please note: Blood groups are not reported over the phone or reports are not faxed.
- Blood group reports are also not available on Healthlink.

5.9 ANTENATAL SAMPLES

- All antenatal samples for blood grouping are sent to MRH @ Mullingar using the Mullingar Ante-natal Blood Transfusion Form.
- Samples from antenatal patients will only be tested in the Blood Bank in MRHT if there is a medical emergency where the patient must be treated in MRHT. Normal MRHT collection and labelling procedures must be followed.

MRH @ Mullingar provides the service for termination of pregnancy. This service is inclusive of the provision of prophylactic Anti-D for Rh-D negative persons.

5.10 CONCESSIONARY RELEASE OF BLOOD AND BLOOD PRODUCTS

- Concessionary release of blood components or blood products, or acting contrary to a Standard Operating Procedure (SOP) is sometimes the necessary and appropriate course of action in the best interest of the patient.
- To act contrary to an SOP requires prior authorisation or justifiable authorisation as soon after as is practical, by the Consultant Haematologist or other suitably competent person who should discuss the clinical consequence with the clinicians in charge of the patient.
- Conditions that require concessionary release:
 - Use of RhD Positive blood for a RhD Negative patient who would normally be excluded from receiving RhD Positive units (excluding

group changes in Massive Transfusion situations, as this is pre-approved).

- Use of antigen positive or un-typed red cells in patients with atypical red cell antibodies
- Issue of red cells to patients with AHIA without the necessary exclusion of underlying antibodies. This is the only circumstance where “least incompatible” red cells might be the best option.
- Issue of components that do not meet known special requirements e.g. CMV negative, Irradiated or platelets in “PAS”.
- Where it is necessary to act contrary to an SOP in the best interest of the patient.

6. INFORMATION ON COMPONENTS AND PRODUCTS

6.1 CONSENT AND PATIENT INFORMATION LEAFLETS

- In a situation where a patient requires a blood transfusion as part of medical treatment, the doctor should explain to the patient the proposed transfusion treatment and obtain **verbal consent**. This should then be documented on the patient's Blood Transfusion Prescription Record Sheet (BTPRS) and/or chart. Tick boxes are located on the BTPRS for documenting provision of an information leaflet and gaining of verbal consent.
- Patients have a fundamental legal and ethical right to consent to or refuse treatment. For guidance healthcare workers must refer to the hospital consent guidelines for direction in relation to consent or refusal of treatment.
- Blood Transfusion Information Leaflets are available in each clinical area. (Please inform the TSO or BT laboratory if your clinical department requires additional leaflets)
- There are circumstances where obtaining verbal consent and issuing a patient information leaflet may not be practicable/necessary e.g.;
 - Unconscious/impaired patients are unable to be consented but where possible relatives in attendance should be advised of the immediate plan of care.

- Patients who are regular transfusion recipients and receive blood components/products as part of their maintenance therapy do not require to be re-issued with a Patient Information leaflet on every transfusion episode but verbal consent from these patients should be obtained and recorded on the BTPRS e.g. patient(s) who have been diagnosed with chronic Haematological disorders or Oncology/ Haematology patients who require 'top up transfusion therapy'. In these instances, the patient's management plan should be readily accessible in the patient health care record.
- If the patient is unable to understand the leaflet (e.g. child or language barrier) then the information should be related to them in a language they understand. This may necessitate requesting an interpreter.
- **Day Patients** discharged from hospital following the transfusion should be supplied with a "Post Transfusion Information Leaflet for Day Patients". This leaflet lists the signs and symptoms of transfusion reactions and provides information regarding hospital contact numbers.

6.2 PRESCRIPTION OF BLOOD COMPONENTS AND PRODUCTS

1. Blood components and blood products must be prescribed by a medical practitioner.
2. The BTPRS is used for the prescription and administration of Red Cells, Plasma, Platelets and Factor Concentrates only. All other blood based products, for example Albumin and Anti D should be prescribed on the Drug Prescription Sheet.
3. Each unit must be prescribed individually with exception of a **massive transfusion** (The back page of the BTPRS allows for documentation of units in the case of a massive transfusion or an emergency).
4. Each section of the prescription must be written in clear, legible writing stating:
 - Date of transfusion.
 - Component/Product type (State actual volume for paediatrics)

- Indicate if any special requirements are needed for this patient.
See section 5.2 (CMV Neg & Irradiated)
 - Rate of transfusion of component/product
 - Pre transfusion haematology value
 - Reason for transfusion
 - If any specific drugs are to be administered pre, post or with the transfusion they must be prescribed on the patient's Drug Prescription and Administration Record. Enter a tick in the box provided if transfusion related medication is required
 - The Doctor must sign **and** print their name and include their medical council number in the space provided.
5. A transfusion prescription is valid for two days (exception is the standing order in place within the Haematology Service).
6. A transfusion prescription is cancelled by a medical practitioner by drawing a line through the prescription. Date and sign to show when cancelled and by whom.

6.3 MAXIMUM BLOOD ORDERING SCHEDULE (MSBOS) AND BLOOD STOCK MANAGEMENT

- The MSBOS for the hospital are currently available for
 - a) General Surgical
 - b) Orthopaedics
 - c) Ear Nose and Throat (ENT).
- Check clinical area for the current version.
- Crossmatched blood is routinely held for approximately 48 hours from issue. The Blood Bank must be notified if the surgery date or blood requirement is changed as crossmatched blood will be returned to stock after 48 hours and can be made available for another patient.
- The Blood Bank requests that inappropriate/unnecessary requests for blood are avoided as this places a burden on a very limited and precious resource of blood.

6.4 BLOOD TRANSFUSION REPORTS

Blood Bank reports are delivered to the wards via the hospital chute system once they are authorised. The reports can be collected from the laboratory if available earlier.

It is the responsibility of the ward staff/doctor to ensure the Blood Transfusion report is available prior to theatre.

Blood Bank staff will never give verbal reports of blood groups over the phone.

6.5 ADDITIONAL TEST REQUESTS

- **Additional requests for blood components/products post reservation of the initial pre transfusion sample** (e.g. add crossmatch request) are made by sending an "Additional Test/Additional Component Orders Form" (T/BTL/RC/009-03).
- Complete all required sections of this form and sent it to the BT laboratory via the chute system.
- Blood Products will not be released until the Additional Test request has been received in the Blood Bank.
- **Where this request is urgent - notify the Blood Bank by telephone when the Additional Test/Additional Component Orders Form has been sent.**
- In emergency situations a Telephone Request is acceptable but should be followed up with an Additional Test/Additional Component Orders Form when time permits.

18T2204

Blood Transfusion Laboratory Tullamore

T/BTL/RC/009-03 V01

Additional Tests/Additional Component Orders Form

| Patient Demographics | | Critical/Urgent Requests | |
|--|----------|--|------------------------------|
| Print Details or Affix Patient Demographics Label here | | It is permitted to phone the Blood Transfusion Laboratory @ 58385/58387 to request product. The phone request should be followed-up by this written request form as soon as practicable. | |
| Patient Name: _____ Chart No: _____ D.C.B.: _____ Gender: Male <input type="checkbox"/> Female <input type="checkbox"/> Ward: _____ Consultant: _____ | | | |
| | | Additional Testing DCT/DAT <input type="checkbox"/> | |
| Additional Component Orders | | | |
| Please select additional components order: | | | |
| Blood Component/Products | Quantity | Special Requirements (Please Tick) | Comment |
| Red Cell Unit(s) | | <input type="checkbox"/> CMV Neg <input type="checkbox"/> Irradiated <input type="checkbox"/> Other | |
| Platelet Pack(s) | | | Standard Adult Dose = 1 Pack |
| Plasma Unit(s) | | N/A | 1 Unit = 1 Bag (200mls) |
| Prothrombin Complex Concentrate (PCC/Ocapsev) IU: | | Note: Requests for PCC/Ocapsev should be discussed with the Haematology Team with exception of Warfarin reversal in severe bleeds. | |
| Coagulation Factors (e.g. Fibrinogen, Factor VII, Factor VIII): | | | |
| Name of product: _____ | | Dose Required: _____ | |
| I confirm this patient's requirements were discussed with _____ | | _____ from the Haematology Team | |

Authorised by _____

Requested By: _____

Completion of this section is MANDATORY

6.6 COLLECTION OF BLOOD COMPONENTS AND PRODUCTS

Only trained collectors (specified multi task attendants e.g. house porters and health care assistants) can collect the blood products from the fridge in the blood issue room or the Blood Transfusion Laboratory. Blood or blood components can never be transported to the ward in the hospital chute system. If a trained collector is not available, contact the medical scientist on duty.

6.7 TRACEABILITY OF BLOOD COMPONENTS AND PRODUCTS

It is a **legal requirement**, that all blood components/products dispatched from a transfusion laboratory are 100% traceable as required by the EU Blood Directive 2002/98/EC.

When BloodTrack Tx has been used there is no requirement to complete the traceability label (automatic fating).

Where the transfusion is recorded manually (e.g. Octaplex or O Negative Emergency Red Cells) the traceability label must be detached from the unit, once the first few millilitres have been infused and completed by either of the administrators: - Signature, Printed name, the date and time commenced. Place completed label in an envelope marked **Blood Transfusion Lab** and return to the transfusion laboratory.

6.8 RED CELL CONCENTRATE (RCC) - INFORMATION

Indication for RCC is to increase the oxygen carrying capacity so as to improve tissue oxygen delivery.

RCC is ordered from the BT laboratory by completing in full a BT request form and providing a correctly filled and labeled sample.

If a previous G&S was taken within the last 72 hours you may send an Additional Tests Additional Component Orders Form (T/BTL/RC/009-03).

The Volume of RCC is stated on each pack and is approximately 285 mls.

A guideline T/HVBT/GL/009 - Guideline for Prescribing Red Cells in Midland Regional Hospital Tullamore is available in the clinical areas. The purpose of this document is to provide guidance for decision making in regard to Red Cell prescribing. Its purpose is not prescriptive or to replace clinical judgement. However, the guideline is aiming for more restrictive thresholds for patients who need Red Cell transfusion but do not have Major Haemorrhage or Acute Coronary Syndrome. This guideline provides information on preventing Transfusion Associated Circulatory Overload.

Transfusion Rate

- Except in the massive transfusion setting, transfusion rates for blood should not exceed 2-4 mls/kg per hour.
- **For routine administration there is extensive experience of safely administering a unit of RCC over 90 to 120 minutes** (BSH 2017).
- Note however from starting the infusion of **RCC** (i.e. puncturing the blood pack with infusion set) to completion of the RCC transfusion, *a maximum of four hours must not be exceeded.*
- If the IV cannula, tissues while a blood component/ product is in progress, the cannula must be re-sited within **thirty minutes** otherwise the blood component/product must be discarded.

Blood Administration sets

- Blood administration sets must be changed after every two units of RCC/platelets or six hourly whichever comes first.
- A new blood administration set must be used if changing to a different blood component/ blood product type.
- Multiple blood components administered sequentially through the same set should be ABO compatible.
- In the **massive transfusion** setting the blood administration set may be changed as frequently as practical while observing the previous two points.

Patients at risk of cardiac failure

- Clinical assessment of patients at risk of cardiac failure should include an evaluation of the patient's age, body weight and concomitant medical

conditions that predispose to Transfusion Associated Circulatory Overload (TACO): cardiac failure, renal impairment, hypoalbuminaemia and fluid overload. These factors should be considered when prescribing the volume and rate of the transfusion, and in deciding whether diuretics should be prescribed (BCSH 2012).

- A formal pre-transfusion Risk assessment for TACO should be performed wherever possible as TACO is the most commonly reported cause of death and major morbidity (SHOT 2017 Bolton-Maggs) see T/HVBT/GL/009 - Guideline for Prescribing Red Cells in Midland Regional Hospital Tullamore.
- Single unit red cell transfusions are recommended where possible, especially in non-bleeding patients (BSH 2017).
- In very low weight/at risk patients, it may be advisable to transfuse units with an interval of 24 hours between each unit, in combination with pre-transfusion diuretics (NHO 2012). Paediatric transfusions should be prescribed in mls.
- Consider rate of 1ml/kg per hour (NHO 2010).

6.9 PLATELETS - INFORMATION

- For clinical advice contact the Consultant Haematologist(s). Indications for use are detailed in Guideline T/HVBT/GL/006 "The Administration of Blood Components and Products", current revision.
- Platelets are usually not kept in stock and may need to be ordered from IBTS, on a named patient basis.
- If there is no previous sample- Platelets are ordered by completing a BT request form and providing a correctly filled and labeled sample. Refer to Section 4.6 Confirm sample requirements.
- If a previous G&S was sent, then you may send an Additional Tests Additional Component Orders Form (T/BTL/RC/009-03) to order platelets.
- Note: Only one bag of platelets may be ordered at a time for adults, paediatrics and neonates unless there is a strong indication for more than one bag. The Consultant Haematologist will advise.
- Standard dose is 1 bag. Should raise the count by approx **20 x10⁹/L** but more may be required for active bleeding.
- Children < 20 kgs dose = (10-20 mls/kg).

- Platelets are either pooled (4 to 5 donors), apheresis (single donor) and in some cases HLA matched (usually for patient's refractory to regular Platelets)
- Failure of the platelet count to rise to/above the target should be discussed with the Consultant Haematologist.
- In the event of a massive haemorrhage, you may need to order platelets before laboratory results are available. However, it is important to take the FBC beforehand as this will serve as a baseline.
- Allow a minimum of 3 hours for transportation and issue.
- Platelets can be stored in the Platelet Agitator until expiry.
- Each dose of platelets should be transfused over a period of 30–60 minutes. Must be completed within 4 hours.
- **A 30 to 60-minute platelet count post infusion to assess the effectiveness of the treatment is recommended, especially if the patient's responsiveness is unknown.**

6.10 PLASMA (LG OCTAPLAS) - INFORMATION

- Plasma is available as LG Octaplas for group A, B, AB and O. The objective of a plasma transfusion is to replace clotting factors where there is evidence of critical deficiencies.
- For clinical advice contact the Consultant Haematologist(s).
- Indications for use are detailed in Guideline T/HVBT/GL/006 "The Administration of Blood Components and Products," current revision.

Dosage:

- The **Dosage** of plasma is determined by the clinical condition of the patient and the underlying disease.
 - The **volume** per unit is 200mls.
 - Dose 12-15mls/kg is a generally accepted starting dose e.g. 70 Kg adult = 840mls-1050mls/70kg = 4 - 5 units/bags.
 - In patients with widespread microvascular oozing, plasma dosage may need to be given up to 30mls/kg.

- The laboratory should be notified at least 40 minutes in advance as these units must be thawed and issued.
- If no previous sample - Plasma is ordered by completing a BT request form and providing a correctly filled and labeled sample. Refer to Section 4.6 Confirm sample requirements.
- If a previous G&S was sent then you may send an Additional Tests Additional Component Orders Form (T/BTL/RC/009-03).
- **LG Plasma – Octaplas (O, A, B or AB)** must be used within 8 hours of thawing when stored at room temperature and within 24 hours if stored at 4°C in laboratory controlled fridge.
- It is advisable to repeat the Coagulation screen post infusion of plasma products.

6.11 FIBRINOGEN

Fibrinogen concentrate (e.g. Riastap) is available from the blood bank for the treatment of patients with acquired hypofibrinogenaemia, for example in patients with disseminated intravascular coagulation, severe blood loss, or failure of hepatic synthesis.

Dosing – For information on Fibrinogen Concentrate see T/HVBT/GL/007 “The use of Factor Concentrates” and the product information leaflet with the fibrinogen concentrate.

- 1 g of Fibrinogen concentrate will raise plasma fibrinogen by .25g/L.
- Where possible a coagulation sample requesting fibrinogen level should be taken prior to requesting Fibrinogen Concentrate.
- If plasma fibrinogen level is <1.5g/L, the usual dose is 2-4g.

For clinical advice contact the Consultant Haematologist(s).

6.12 COAGULATION FACTORS - INFORMATION

For clinical advice contact the Consultant Haematologist(s).

Guideline T/HVBT/GL/007 “The use of Factor Concentrates” is available in the Blood Transfusion folders in clinical areas.

A BT request form or Additional Tests Additional Component Orders Form (T/BTL/RC/009-03) must be sent to the Blood Bank, stating the dose and name of the required product and time required.

The Coagulation Factors that are currently in stock and proposed uses are listed below. Note coagulation products are sourced nationally hence product names may change from those listed.

| Coagulation Factor | Proposed Use |
|---|---|
| Prothrombin Complex Concentrate (e.g. Octaplex) * | <ul style="list-style-type: none"> ➤ Warfarin overdose with bleeding ➤ Peri operative prophylaxis |
| Fibrinogen Concentrate (e.g. Riastap) | <ul style="list-style-type: none"> ➤ For correction of fibrinogen deficiency (e.g. acquired due to DIC) in patients who are bleeding or require procedures. |
| Recombinant Activated Factor VII (e.g. NovoSeven) | <ul style="list-style-type: none"> ➤ Haemophilia with inhibitors. ➤ FVII deficiency. ➤ Glanzmann's Thrombasthenia. ➤ May also have a role in the correction of coagulopathy associated with severe bleeding where other treatments have failed. |
| Human Coagulation Factor VIII (e.g. Wilate) | <ul style="list-style-type: none"> ➤ Severe Von Willebrand's Disease |
| Recombinant Coagulation Factor VIII (e.g. Elocta) | <ul style="list-style-type: none"> ➤ Treatment of Haemophilia A |
| Recombinant Factor IX (e.g. Alprolix) | <ul style="list-style-type: none"> ➤ Treatment of Haemophilia B |

*Prothrombin Complex Concentrate (Octaplex) is currently the product of choice for the reversal of the effects of Warfarin. Off licence use of PCC may be recommended for major haemorrhage secondary to a Direct Oral Anticoagulant (i.e. Anti Xa inhibitor only) in life threatening/major bleed but seek Haematology advice.

6.13 REVERSAL OF WARFARIN

ELEVATED INR – NONE or MINOR BLEEDING

INR

**INR
3.0 – 6.0**

Reduce Warfarin dose or stop
Dose reduce by 10-20%
Restart when INR <5.0
Aim for original INR target

**INR
6.0 – 8.0**

Stop Warfarin
Restart when INR <5.0
Consider Vitamin K 0.5-1mg PO
if minor bleeding, age >70yrs
or Hx of bleeding complications

INR > 8.0

Stop Warfarin
Restart when INR <5.0
Consider Vitamin K 0.5-2mg PO
Recheck INR between 6-12hrs
If INR remains elevated at 24hrs –
repeat dose of Vitamin K

ELEVATED INR – MAJOR BLEEDING

Major Bleeding

Irrespective of INR

Intracranial bleed,
retroperitoneal bleed,
muscle bleed with
compartment syndrome,
GI bleed, vital organ
bleed (e.g. eye),
active bleed with low BP
or 2gm/dl drop in HB

Vitamin K 10mg IV

PCC is treatment of choice

PCC dose as per INR-

2.0 – 3.9 – 25 units/kg

4.0 – 6.0 – 35 units/kg

>6.0 – 50 units/kg

**The single dose should not
exceed 3,000 units Octaplex**

Recheck coagulation screen 20-60
mins post, six hourly & daily
thereafter

Rarely PCC may be contraindicated
and Plasma may be required

Consult with Haematology for advice
for PCC use in Liver disease, DIC or
Mechanical valves

For CNS bleeds Neurosurgical review
is always required

PLANNED SURGICAL PROCEDURES

Planned Surgery

All patients should have their anticoagulation reviewed in advance

Stop Warfarin 5 days in advance of surgery

Check INR day before surgery

If INR not fallen sufficiently consider Vitamin K 5mg

Risk of VTE with interruption of anticoagulation varies according to indication and co-morbidities

All patients should be stratified according to their risk for VTE and risk for bleeding

If high risk of Thrombosis contact Haematologist for advice on bridging anticoagulation

Inappropriate use of PCC for planned surgical procedures is costly and may expose patients unnecessarily to blood products

EMERGENCY/URGENT SURGERY OR PROCEDURE

Emergency Surgery

If surgery can be delayed (but necessary within 3 days) reverse anticoagulation with Vitamin K 2mg – 5mg IV or PO to reduce INR to <1.5

If immediate surgery required, Vitamin K 5mg -10mg +/- PCC or Plasma may be required

Discuss with Haematology

Repeat Coag screen pre surgical intervention (as per guidelines)

6.14 REQUESTS FOR ALBUMIN

- Indications for Albumin use are detailed in Guideline T/HVBT/GL/006 "The Administration of Blood Components and Products," current revision.
- **Indications for Human Albumin Solutions:** There are no absolute indications for the use of Human Albumin Solution (see product insert).
- **Availability:** Available from the Blood Issue Room (in Pathology Dept)
 - 20% human albumin (100mls) and 5% albumin (500mls) are available.
 - A Blood Transfusion collection slip is completed and the product collected by a porter (multitask attendant) or Health Care Assistant.
- Note albumin products are sourced nationally hence product names and volumes may change.
- **Prescription and Administration of Albumin**
 - Albumin is prescribed on the drug Prescription Record sheet.
 - The batch number of the product is recorded on this form.
 - Albumin solutions are administered using a standard intravenous administration set.

6.15 UNUSED BLOOD PRODUCTS/COAGULATION FACTORS

- Any blood products taken by the clinical area and unused must be returned to the Blood Bank.
- Unused units of Red Cells that have been out of Blood Bank fridge for **more than 30 minutes** must be returned to the Blood Bank Medical Scientist (not fridge) if not being used. However, these units may be transfused **within 4.5 hours** to that particular patient from the time they were originally removed from the fridge.

6.16 TRANSFER OF BLOOD TO OTHER HOSPITALS

- Transportation procedures for blood to other hospitals are strictly controlled. Where blood needs to be transferred with the patient, **contact the Blood**

Bank so that blood can be appropriately packed in a BC15 cooler and the documentation prepared.

- At least **15 minutes' notice** is required.
- **Please note** all unused units of blood should be returned to the Blood Bank at MRHT in the BC15 cooler, unless the hospital receiving the patient specifically asks to retain it.
- Guideline **T/HVBT/GL/017** "Internal Transport of Blood Components/Products in MRHT and the Transport of Blood Components/Products externally with a patient" is available in the clinical areas.

6.17 MASSIVE TRANSFUSION (MAJOR HAEMORRHAGE)

Definition of a Massive Haemorrhage:

A massive/major haemorrhage may result in significant patient morbidity or mortality and hence early recognition and commencing appropriate management as soon as possible is the goal.

There are many **definitions of "Massive Haemorrhage"** usually based on volume of blood loss or volume of blood transfused.

- a) The most widely used definition proposes the loss or transfusion of one blood volume (about 7% of body weight in adults – adult blood volume is approximately 70ml/kg) over 24 hours; or approximately 10 units of red blood cells (NBAA 2011).
- b) An ongoing transfusion requirement in an adult of >150mls per minute.
- c) Replacement of > than 50% of blood volume in ≤ 3 hours.

A Major Haemorrhage may be described as bleeding which leads to a heart rate more than 110 beats/min and/or systolic blood pressure less than 90 mmHg (Hunt et al 2015).

Guideline **T/HVBT/GL/014** "A guideline for the use of Blood in the Management of a Massive/Major Haemorrhage" is available in the clinical areas. This includes the Acute Massive/Major Blood Loss Template which is a guide on the use of blood components and products.

In addition a **Massive Transfusion Protocol is in place in the Emergency Department**. All staff to which this is applicable should be aware of how to activate and use this protocol.

In the event of a Massive or Major Haemorrhage **contact key personnel** and inform them that a "Massive Haemorrhage" is in progress. This is done directly by phone / pager / or via switchboard by stating clearly the personnel you want contacted.

6.18 TRANSFUSION REACTION INVESTIGATION

In the case of a **suspected Blood Transfusion reaction** clinical staff should refer to the Guideline **T/HVBT/GL/005** "*Management of Adverse Transfusion Reactions and Events*" available in the Blood Transfusion folders in clinical areas which lists Signs and Symptoms, Causes, Management and Investigations required for Acute and Delayed Transfusion Reactions. If further advice required contact the Consultant Haematologist(s)/Registrar for advice (via the switch board).

Depending on the type of reaction - Samples required may include

- Returning blood pack with giving set attached and spigotted
- Repeat CXM sample to include Direct Coombs Test (EDTA sample)
- **Cultures:** - If patient is febrile blood cultures (peripheral and in dwelling lines)
- FBC with reticulocyte count and blood film
- Coagulation Screen
- U/E to include renal profile, LDH and serum bilirubin
- Urine sample for haemoglobinuria and urobilinogen
- Further investigations as per Haematologist and Transfusion Medical Scientist's instruction.

7. SAMPLE RETENTION

Primary samples are stored for 72hrs during which they are available for any additional patient requirements.

After the 72hrs have elapsed samples are retained for an additional 11 days in case any further investigations i.e. Delayed Serological Reaction need to be carried out.

8. QUALITY ASSURANCE

The Blood Bank participates in the following Quality Assurance Schemes

| Distributor | QA Programme |
|--|----------------------------|
| UK National External Quality Assessment Scheme (UK NEQAS) | 1. ABO and RhD grouping |
| | 2. Antibody Detection |
| | 3. Antibody Identification |
| Irish External Quality Assessment Scheme (IEQAS) | 4. Antigen-typing |
| | 5. DAT |
| | 6. Crossmatching |
| Welsh Assessment of Serological Proficiency Scheme (WASPS) | |

EXTERNAL TESTS



CONTENTS**1. INTRODUCTION****1.1 HANDLING AND TRANSPORT OF SAMPLES****1.2 FORM AND SAMPLE LABELLING REQUIREMENTS****1.3 SPECIMEN REQUIREMENTS/ADDITIONAL TESTING****1.4 SAMPLE REJECTION****2. TESTS SENT TO EXTERNAL LABORATORIES****3. REPORTS ISSUED BY EXTERNAL LABORATORIES**

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1. INTRODUCTION

Many tests are performed in the laboratories at MRHT. However, a number of more specialised tests are sent to External Laboratories for processing.

The External Tests referral area is situated in Specimen Reception and may be contacted at extension **58354** (057-9358354).

1.1 HANDLING AND TRANSPORT OF SAMPLES

To protect the safety of all healthcare staff, the following precautions for the transportation of samples must be followed:

- All samples are to be taken into the correct sample containers and placed in approved biohazard bags with request form placed separately in the sleeve provided or in specibags with the form attached.
- The outside of the sample tube must not be contaminated with blood/body fluids.
- Blood or body fluid-stained laboratory request forms must not be submitted.
- Samples can be transported to the laboratory at room temperature unless otherwise stated in the sample requirements section.

1.2 FORM AND SAMPLE LABELLING REQUIREMENTS

The General Biochemistry/Haematology Request form is used for requests for external tests. All parts of the form are to be completed in full. General test guidelines are given on the back of the request form.

All writing on the request form must be clearly legible (block capitals preferred) so that the information provided is legible, thus ensuring proper identification of the patient and all tests requests. Writing should be in ballpoint pen (not marker) to ensure the information is copied through to each sheet of the request form. Refer to section 7.2 and 7.3 in the **General Information** section of this manual for further details on form and specimen labelling.

Request form must contain requesters name and location so that results can be returned in a timely manner.

Note: Computer generated labels may be used on the request form (**one label required on each sheet of the request form**).

1.3. SPECIMEN REQUIREMENTS/ADDITIONAL TESTING

Each test request requires a separate specimen. This is most important for multiple test requests which may be sent to different laboratories. There may be some exceptions to this e.g. B₁₂, Folate and Ferritin requests need one specimen only for all three tests when requested together.

It is not possible to add an additional test request to a specimen which has been sent for an external test unless a spare specimen has been received. Each new request requires a new specimen to be taken and a new request form to be sent. Refer to the table in **Section 2** for individual test requirements.

Refer to **Section 7** of the **General Information Section** of this Manual for the Labelling Criteria for both request form and specimens.

Note: The External Tests referral area does not share specimens with the Biochemistry laboratory. It is not safe practice to split specimens from the original specimen container.

In exceptional circumstances e.g. neonatal specimen, it may be possible to allow additional testing on an original sample. Contact the External Tests Department at extension **8354** (057-9358354) to discuss each individual case.

Note: Some tests are **restricted** to Consultants' consent and may require consent forms to be filled out. Restricted tests are indicated in the following tables.

1.4. SAMPLE REJECTION

Laboratory staff are only authorised to accept samples which meet with the required labelling criteria. Please refer to **Section 7** of the **General Information Section** of this manual for further information.

2. TESTS SENT TO EXTERNAL LABORATORIES

The following tables list tests which are sent to external laboratories, sample and special requirements and restricted tests.

Note: New tests and modifications of existing sample requirements may come on line during the life span of this document. This list is valid as of the approval date of this document. Recent amendments may not be reflected in the following table.

For information and contact details of external referral laboratories please contact Specimen Reception on 05793 58354

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|---|--|---|---------------------|
| ACE (angiotensin converting enzyme) | 1xSerum: amber 4.9ml | None | N/A |
| Acetylcholine receptor antibodies | 1xSerum: amber 4.9ml | None | N/A |
| ACTH (adrenocorticotrophic hormone) | 2xEDTA: pink 2.7ml | Patient fasting. Bring samples to lab on ice. Spin, separate & freeze. | N/A |
| ADAMTS 13 /Anti ADAMTS antibodies (inhibitory activity) | 2xCitrate: green 3ml | Spin spec at 2000rpm / 10mins. Separate and spin again at 2000rpm /15mins. Separate avoiding buffy coat and put into 3 x 0.5ml aliquots and freeze. Arrange dry ice with Biomnis. Removed 'consent form needed' | Consultant |
| ADH (anti diuretic hormone) | 5ml EDTA + Aprotinin | Order Tube from Biomnis. Spin at 4C, separate & freeze.<1hr | N/A |
| Adrenal cortex antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Adrenocorticotrophic hormone (ACTH) | 2xEDTA: pink 2.7ml | Patient fasting. Bring samples to lab on ice. Spin, separate & freeze. | N/A |
| Aldolase | 1 x Serum: amber 4.9ml | Refrigerated | N/A |
| Aldosterone (recumbant & standing) | 2xEDTA: pink 2.7ml | Patient 45 min recumbant, take bloods. Patient 20 min standing, take 2nd set of bloods. Send bloods to lab immediately after being taken at each step. Spin immediately, separate & freeze. | Consultant |
| Aldosterone and renin (recumbant & standing) | 4xEDTA: pink 2.7ml | Patient 45 min recumbant, take bloods. Patient 20 min standing, take 2nd set of bloods. Send bloods to lab immediately after being taken at each step. Spin immediately, separate & freeze. | Consultant |
| Aldosterone and renin (Random) | 1xSerum 4.9ml or 1xLithium Heparin 2.7ml. + 2xEDTA: pink 2.7ml | Highlight 'random' on request form | N/A |
| Allergy tests (must specify allergy) | 1xSerum: amber 4.9ml | None | N/A |
| Alpha 1 anti-trypsin | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|--|---|--|---------------------|
| Alpha 1 anti-trypsin phenotype | 2 X EDTA: Pink 2.7ml | previous anti-trypsin result required and noted on request form | N/A |
| Alpha gliadin antibodies (tTG/tissue transglutaminase antibodies) | 1xSerum: amber 4.9ml | None | N/A |
| Aluminium level | Trace Metal bottle kept in Renal Dialysis | Special bottle kept in Renal Dialysis | N/A |
| AMH (anti Mullerin hormone) | 1 X Serum: amber 4.9ml | Must specify if test was performed/not performed previously. | N/A |
| Aminophylline level | 1xSerum: amber 4.9ml | None | N/A |
| Amiodarone (cordarone) | 1xSerum: amber 4.9ml | Send to Lab without delay. Spin immediately. | N/A |
| AML/APL transcripts (PML RARA) | 2xEDTA: pink 2.7ml | Take sample before patient given medication | Consultant |
| Ammonia level | 1xEDTA: Pink 2.7ml | Pre arrange with Mullingar, must go in Taxi. Spin separate and freeze. | N/A |
| Ampicillin allergy | 1xSerum: amber 4.9ml | None | N/A |
| ANA (anti nuclear antibody/antibody screen) | 1xSerum: amber 4.9ml | None | N/A |
| ANCA antibody titre & ANCA-C/P (proteinase 3 – Anti-neutrophil cytoplasmic antibodies) | 1xSerum: amber 4.9ml | None | N/A |
| Androstenedione levels | 1xSerum: amber 4.9ml | None | N/A |
| ANF (anti nuclear factor) | 1xSerum: amber 4.9ml | None | N/A |
| Angiotensin converting enzyme (ACE) | 1xSerum: amber 4.9ml | None | N/A |
| Antenatal blood group | 1xEDTA: red 7.5ml | None | N/A |
| Anti B19 (Parvovirus) | 1xSerum: amber 4.9ml | None | N/A |
| Anti Cardiolipin antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Anti CCP (anti cyclic citrullinated peptide) | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|---|--|--|--------------------------|
| Anti diuretic hormone (ADH) | 5ml EDTA + Aprotinin | Order Tube from Biomnis. Spin at 4C, separate & freeze.<1hr | N/A |
| Anti gliadin antibodies (tTG/tissue transglutaminase antibodies). | 1xSerum: amber 4.9ml | None | N/A |
| Anti glomerular basement antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Anti Mullerin hormone (AMH) | 1xSerum: amber 4.9ml | Must specify if test was performed/not performed previously. | N/A |
| Anti phospholipid antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Anti proteinase 3 | 1xSerum: amber 4.9ml | None | N/A |
| Anti smooth muscle Antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Anti thrombin level | 4xCitrate: green 3ml | Must be sent by taxi same day. Taxi @ 13.00hrs | N/A |
| Anti trypsin level | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test |
| Anti-Xa (DEB/diepoxybutane testing/factor 10) | 2xCitrate: green 3ml or Bone marrow aspirate in RPMI | Take sample 2-4 hrs post dose of heparin. Send to Dublin by taxi. Or spin & freeze serum. Send up frozen serum and remaining sample. | Consultant Haematologist |
| APCR (Activated protein C resistance). See thrombophilia screen. | 2xEDTA: pink 2.7ml 6xCitrate: green 3ml 1xSerum: amber 4.9ml | Must reach St James same day. | Consultant Haematologist |
| Aspergillus antibodies | 1 x Serum:amber 4.9ml | Refrigerated. | N/A |
| Atypical pneumonia screen | 1 x Serum:amber 4.9ml | Refrigerated | N/A |
| B12 level | 1xSerum: amber 4.9ml | None | N/A |
| B2 Microglobulin | 1xSerum: amber 4.9ml | None | N/A |
| B2-Glycoprotein I | 1xSerum: amber 4.9ml | None | N/A |
| Bartonella (cat scratch) antibodies | 1 x Serum:amber 4.9ml | Refrigerated | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|--|---|--|--------------------------|
| BCR ABL | 5xEDTA: pink 2.7ml | Sample must reach St James' inside 24 hours. | Consultant Haematologist |
| Beta HCG (serum) | 1xSerum: amber 4.9ml | None | N/A |
| BK virus (polyoma) | 1xSerum: amber 4.9ml 1xUrine MSU | Spin, separate, freeze serum. Freeze urine. | N/A |
| Blood transfusion investigation | 2xEDTA: white/red 7.5 ml | | Blood Transfusion Lab |
| Bone marrow & blood flow cytometry | Bone marrow aspirate in RPMI Peripheral blood 2xEDTA: pink 2.7ml | Blood film/Bone marrow aspirate slides. Send FBC results. | Consultant Haematologist |
| Bone Marrow Failure | 2 x Blood Transfusion EDTA 7.5 ml | Minimum 4ml Blood Volume in Both Samples Must have completed Molecular Diagnostics Referral Form and Patient consent form Send FBC result and a blood film It is important to send an FBC sample and request and blood film for referral. | Consultant Haematologist |
| Bone marrow immunophenotyping | Bone marrow aspirate slides | Send FBC result. | Consultant Haematologist |
| Bordetella pertussis antibody | 1 x Serum: amber 4.9ml | Refrigerated | N/A |
| Borrelia burgdorferi antibodies (Lyme disease) | 1xSerum: amber 4.9ml | None | N/A |
| Brucella antibodies | 1xSerum: amber 4.9ml | Refrigerated | N/A |
| Budgerigar feathers allergy | 1xSerum: amber 4.9ml | None | N/A |
| C – Peptide levels | 1xSerum: amber 4.9ml | None | N/A |
| C1 Esterase inhibitor | 1xSerum: amber 4.9ml | None | N/A |
| C3 & C4 Complement | 1xSerum: amber 4.9ml | None | N/A |
| Calcitonin | 1xSerum: amber 4.9ml | Spin, separate and freeze | N/A |
| Calprotectin | Random faeces | Please include Date sample produced | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|--|---|---|--------------------------|
| Carbamazepine level | 1xSerum: amber 4.9ml | None | N/A |
| Cardiolipin antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Carnitine (free and total) | 2xLith Heparin: orange 2.7ml | Spin,seperate and freeze | N/A |
| Cat allergy | 1xSerum: amber 4.9ml | None | N/A |
| Catch scratch (Bartonella antibodies) | 1 x Serum:amber 4.9ml | Refrigerated | N/A |
| Catecholamines | 24 hr Urine – with HCl (10ml of 0.1NHCL added.) | pH & volume noted. 3x10ml sent for test | N/A |
| CCP antibodies (cyclic citrullinated peptide) | 1xSerum: amber 4.9ml | None | N/A |
| CD4/8 T cell subsets | 2xEDTA: pink 2.7ml | None | Consultant |
| Ceruoplasmin | 1xSerum: amber 4.9ml | None | All |
| CF common mutations | 2x EDTA:Pink 2.7 ml | Consent form needed | All |
| CFTR mutation (sent to cytogenetics in Crumlin as part of acute pancreatitis screen) | 2xEDTA: pink 2.7 ml | Consent form needed. | Consultant |
| CH100 | 1xSerum: amber 4.9ml | Spin, separate and freeze. State time and dose of last drug intake. | Consultant Haematologist |
| Chitotriosidase level | 2xEDTA: pink 2.7ml | None | N/A |
| Chlamydia | Swab (except eye swab goes to NVRL) or Urine | Swab: Special swab kept in Microbiology Laboratory | N/A |
| Chloroquine level | 1 x Serum:white 7.5ml | Spin & freeze<4hrs State time and strength of last dose. Do not use phase separator in tubes. | N/A |
| Chlorpromazine (Largactil) | 1 x Serum:white 7.5ml | Spin & freeze<4hrs State time and strength of last dose. Do not use phase separator in tubes. | N/A |
| Cholinesterase | 1xSerum: amber 4.9ml | Refrigerated | N/A |
| | | | |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|---|---|---|---------------------|
| Chromium | 2xTrace Metal Bottles: orange 7.5ml (kept in Biochemistry) Specialist needles also kept in Biochemistry. | Draw sample into first bottle and discard that sample, use second sample. | N/A |
| Chromogranin A | 1xSerum: amber 4.9ml | None | |
| Chromosomal Analysis | 1xLithium heparin: orange 2.7ml | Send Ambient | N/A |
| Chromosome studies | Depend on test specified | Please specify test | N/A |
| Citrate (Urinary) | 24 hr Urine | Volume noted. 3x10ml sent for test Freeze | N/A |
| CLL (FISH) | 2 x EDTA: pink 2.7ml + 1 x Lith Hep: Orange 2.7 ml | | Consultant |
| CMV PCR (Cytomegalovirus) | 2xEDTA: pink 2.7ml | Spin, separate & freeze plasma + cells immediately. | N/A |
| CMV antibodies (Cytomegalovirus) | 1xSerum: amber 4.9ml | None | N/A |
| Cobalt level | 2xTrace Metal Bottles: orange 7.5ml (kept in Biochemistry) Specialist needles also kept in Biochemistry. | Draw sample into first bottle and discard that sample, use second sample. | N/A |
| Coeliac antibodies (tTG/tissue glutaminase antibodies /Alpha gliadin) | 1xSerum: amber 4.9ml | None | N/A |
| Collagen Screen | 1xSerum: amber 4.9ml | None | N/A |
| Copper level | 1xSerum: amber 4.9ml 24 hr urine(acid washed bottle) | Decant urine into Trace Metal bottles before sending | N/A |
| Cordarone (amiodarone) | 1xSerum: amber 4.9ml | Spin & freeze <1 hrs. State time and strength of last dose. | N/A |
| Cortisol 24hr urinary | 24 hr Urine(non acidified) | Refrigerated | N/A |
| Cortisol level | 1xSerum: amber 4.9ml | None | N/A |
| Coxiella burnetii antibodies | 1xSerum: amber 4.9ml | Refrigerated | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|---|--|--|-------------------------|
| Coxsackie virus culture | Faeces or skin swab or throat swab or CSF. | Take sample depending on condition of patient. CSF done by PCR – send sample immediately. Other samples cultured - next day receipt is satisfactory. | N/A |
| CRE Typing (carbapenemase resistant Enterobacteriaceae) | Nutrient agar slope with inoculated organism | Adhere to transport regulations for packaging. Refer to Consultant Microbiologist. | Microbiology Laboratory |
| Crithidia | 1xSerum: amber 4.9ml | None | N/A |
| Cryptococcus neoformans | 1xSerum: amber 4.9ml or CSF | Send same day (check with Consultant Microbiologist) | N/A |
| CSF for Oligoclonal Bands | 1xSerum: amber 4.9ml and CSF | None | N/A |
| CSF for viral studies | CSF | >300µl neat CSF-unspun | N/A |
| Cyclic citrullinated peptide (CCP) antibodies. | 1xSerum: amber 4.9ml | None | N/A |
| Cyclosporin | 2xEDTA: pink 2.7ml | None | Consultant |
| Cystic Fibrosis screen - 108 common mutations | 2xEDTA: pink 2.7ml | Consent form from Specimen Reception. | N/A |
| Cytogenetics on tissue/bone marrow | 2xEDTA: pink 2.7 ml | Consent form needed. | Consultant |
| Cytogenetics FISH (EDTA) | 2xEDTA: pink 2.7 ml 1XLithium Heparin: orange 2.7ml | Consent form needed. | Consultant |
| Cytomegalovirus antibodies (CMV) | 1xSerum: amber 4.9ml | None | N/A |
| Cytomegalovirus PCR (CMV) | 2xEDTA: pink 2.7 ml | Spin separate & freeze plasma and cells immediately. | N/A |
| Cytotoxic antibodies | 1xSerum: white 7.5ml | None | N/A |
| Dengue virus antibodies | 1xSerum: amber 4.9ml | Check with Consultant Microbiologist | N/A |
| DHEAS (dehydroepiandrosterone sulfate) | 1xSerum: amber 4.9ml | None | N/A |
| Digoxin levels | 1xSerum: amber 4.9ml | None | N/A |
| DNA double strand (dsDNA) antibodies | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|---|---|--|--------------------------|
| Dog allergy | 1xSerum: amber 4.9ml | None | N/A |
| E. coli typing | Nutrient agar slope of organism | Adhere to transport regulations for packaging. | Microbiology Laboratory |
| EBV (Epstein Barr Virus) antibodies | 1xSerum: amber 4.9ml | None | N/A |
| EBV (Epstein Barr Virus) PCR | 2xEDTA: pink 2.7ml | Spin, separate and freeze both plasma and cells. | N/A |
| EMA (Eosin 5 Meleamide for flow cytometry) | 2xEDTA: pink 2.7ml | Send FBC result. | Consultant |
| ENA ELISA (extractable nuclear antigens) | 1xSerum: amber 4.9ml | None | N/A |
| Endomysial antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Eosin 5 Meleamide (EMA for flow cytometry) | 2xEDTA: pink 2.7ml | Send FBC result. | Consultant |
| Epanutin (Phenytoin) | 1xSerum: amber 4.9ml | None | N/A |
| EPO (erythropoietin) level | 1xSerum: amber 4.9ml | None | N/A |
| EPO (erythropoietin) receptor antibodies | 4xEDTA: pink 2.7ml | None | N/A |
| Erythrocyte pyruvate kinase | 2xEDTA: pink 2.7ml | Refrigerated | N/A |
| Extrinsic factor antibodies | 1xSerum: amber 4.9ml | Send to Crumlin for Paediatric patients. | N/A |
| Extrinsic Factor assay screen: must state required factors (see individual factors) | 6xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12pm | Consultant Haematologist |
| Factor IX | 3xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor V (Leiden) | 2xCitrate: green 3ml + 2 X EDTA: pink 2.7ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor VII assay | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor VIII assay | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |

EXTERNAL TESTS

| Referred Test | Sample | Special Requirements | Test Restricted to: |
|--|--|--|--------------------------|
| Factor VIII:C | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor X | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor Xa (Anti-Xa DEB/diepoxybutan testing) | 2xCitrate: green 3ml or Bone marrow aspirate in RPMI | Sample to be taken 2-4 hrs post dose of heparin. Send to Dublin by taxi. If not then spin & freeze serum. Send up frozen serum and remaining sample. | Consultant Haematologist |
| Factor XI assay | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12. | Consultant Haematologist |
| Factor XII assay | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Factor XIII | 2xCitrate: green 3ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Fanconi anaemia | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| Farmers lung antibodies (Microspora faenii) | 1xSerum: amber 4.9ml | None | N/A |
| Ferritin levels | 1xSerum: amber 4.9ml | None | N/A |
| FIP1L1 PDGFRA studies | 2xLithium heparin: orange 2.7ml | None | Consultant Haematologist |
| FISH (CLL) | 2 x EDTA: pink 2.7ml + 1 x Lith Hep: Orange 2.7 ml | | Consultant |
| | 1 x Lithium Heparin: orange 2.7ml | | |
| FISH (multiple myeloma) | Bone marrow aspirate slides | 3 unstained unfixed smears | Consultant |
| Fish allergy | 1xSerum: amber 4.9ml | None | N/A |
| Flecainide (Tambacor) | 1xEDTA: pink 2.7ml | Sample must be kept at 4C | N/A |
| Flow cytometry – Bone marrow & blood | Bone marrow aspirate in RPMI | Blood film/Bone marrow aspirate slides. | Consultant |

EXTERNAL TESTS

| | Peripheral blood 2xEDTA: pink 2.7ml | | |
|--|---|---|---------------------|
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Folate & Vitamin B12 | 1xSerum: amber 4.9ml | None | N/A |
| Follicle Stimulating Hormone (FSH) | 1xSerum: amber 4.9ml | None | N/A |
| Fragile X screen | 4xEDTA: pink 2.7ml | Consent form from Specimen Reception. | N/A |
| Free light chain assay | 1xSerum: amber 4.9ml | None | N/A |
| Free T3 | 1xSerum: amber 4.9ml | None | N/A |
| Free T4 (See TFTs) | 1xSerum: amber 4.9ml | None | N/A |
| Fructosamine | 1xSerum: amber 4.9ml | None | N/A |
| FSH (follicle stimulating hormone) | 1xSerum: amber 4.9ml | None | N/A |
| Full virology screen (Renal Dialysis Unit) | 1xSerum: amber 4.9ml | None | N/A |
| G6PD (Glucose 6 phosphate dehydrogenase) | 1xEDTA: pink 2.7 ml | None | N/A |
| GAD (Glutamic Acid Decarboxylase) autoantibodies | 1xSerum: amber 4.9ml | None | N/A |
| Galactomannan | 1xSerum: amber 4.9ml | None | N/A |
| Ganglioside antibodies | 1xSerum: amber 4.9ml | Refrigerated | N/A |
| Gastrin | 1xSerum: amber 4.9ml | Spin, separate and freeze inside 4 hours. | N/A |
| Genetic cationic trypsinogen SPINK-1 mutation | 2xEDTA: pink 2.7 ml | Consent form needed. | Consultant |
| Globulin level | 1xSerum: amber 4.9ml | None | N/A |
| Glomerular basement membrane | 1xSerum: amber 4.9ml | None | N/A |
| Glucagon | 1xEDTA pink 2.7 ml +Aportinine | Spin at 4C. Sepatare and freeze<1hr | N/A |
| Glucose 6 phosphate dehydrogenase (G6DP) | 1xEDTA: pink 2.7 ml | None | N/A |
| Glutamic acid decarboxylase | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| | | | |
|-------------------------------------|--|---|----------------------------|
| (GAD) autoantibodies | | | |
| Glycoprotein I (B2) | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Grass pollen allergy | 1xSerum: amber 4.9ml | None | N/A |
| Growth hormone (somatrophin) | 1xSerum: amber 4.9ml | None | N/A |
| H1N1 Sputum or Swab (Confirmation) | Sputum or Swab | Refer to Consultant Microbiologist. Send in KPA bag | N/A |
| Haemochromatosis mutations | 2xEDTA: pink 2.7 ml 1xFasting Serum: amber 7.5 ml | Consent form needed. | N/A |
| Haemoglobinopathy screen | 1xSerum: amber 4.9ml 1xEDTA: pink 2.7ml | None | Consultant Haematologist |
| Haemophilia screen | 4xCitrate: green 3ml | Must reach St James same day. | Consultant Haematologist |
| Haemophilus influenzae PCR | CSF/Blood | >200µl neat CSF-unspun | N/A |
| Haemosiderin | MSU OR 24 hr Urine - no acid | 2x10ml sent for test | N/A |
| Haptoglobin | 1xSerum: amber 4.9ml | None | N/A |
| Hb A2 (see Thalassaemia) | 2xEDTA: pink 2.7ml 1xSerum: amber 4.9ml | Copy of FBC results must be enclosed. | N/A |
| Hb electrophoresis (Thalassaemia) | 2xEDTA: pink 2.7ml 1xSerum: amber 4.9ml | Copy of FBC results must be enclosed. | Consultant Haematologist |
| HCG (Human chorionic gonadotrophin) | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis A antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis B antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis B Core antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis B HBsAg (antigen) | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis B PCR (DNA viral load) | 1xSerum: white 7.5ml or 2 EDTA: pink 2.7 ml | Spin, separate and freeze serum/plasma and cells | N/A |

EXTERNAL TESTS

| | | | |
|--|---|--|----------------------------|
| Hepatitis B total Core antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis C antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Hepatitis C antigen | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis C PCR (RNA viral load) | 1xSerum: amber 4.9ml or 2 EDTA: pink 2.7 ml | Spin, separate and freeze | N/A |
| Hepatitis E antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Hepatitis screen (Hep A, HBsAg & Hep C) | 1xSerum: amber 4.9ml | None | N/A |
| Her2Neu | FFPP Block | To be accompanied by Histology report | Consultant Pathologist |
| Herpes simplex virus | 1xSerum: amber 4.9ml | None | N/A |
| HIAA – 5 (5-hydroxyindoleacetic acid) | 24 hr Urine – with HCl | pH & volume noted. 2x10ml sent for test | N/A |
| High affinity Hb | 1xEDTA: pink 2.7ml | None | N/A |
| Histoplasmosis | 1xSerum: amber 4.9ml or Biopsy | Refrigerated | N/A |
| HIV antibodies | 1xSerum: amber 4.9ml | None | N/A |
| HIV viral load (PCR) | 2xEDTA: pink 2.7ml | Spin, separate and freeze plasma immediately. | N/A |
| HLA Typing (Oncology) | 4xEDTA: pink 2.7ml | None | Consultant Haematologist |
| HLA B27 (Tissue typing) | 4xEDTA: pink 2.7 ml | None | Consultant Haematologist |
| HLA Class I typing for HLA matched platelets | 2xEDTA: red7.5 ml + serum: amber 4.9ml | Clinical details and platelet count required | Consultant Haematologist |
| HLA tissue typing for potential transplant patients/family | 2xEDTA: white/red7.5 ml | None | Consultant |
| Homocysteine | 1 x Lithium Heparin :orange 2.7ml | Fasting state. Ice immediately after sampling. Spin, separate and freeze <1 hr | N/A |
| House dust mite allergy | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| | | | |
|---|--|---|----------------------------|
| HPA (Human platelet antigen typing) | 2xEDTA: white/red 7.5 ml | None | Consultant Haematologist |
| Human chorionic gonadotrophin (HCG) | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Human platelet antigen typing (HPA) | 4xEDTA: pink 2.7 ml | None | Consultant Haematologist |
| Hydroxyindoleacetic acid – 5 (5-HIAA) | 24 hr Urine - with HCl | pH & volume noted. 2x10 sent for test | N/A |
| Hydroxy-Progesterone-17 (progesterone) | 1xSerum: amber 4.9ml | None | N/A |
| Hydroxyproline | 24hr urine(no preservative) | Avoid collagen rich foods for 48hrs prior, meat jelly, gelatine, ice-cream, confectionary etc | N/A |
| IgE (Immunoglobulin E) | 1xSerum: amber 4.9ml | None | N/A |
| IGF-1 (insulin like growth factor 1) | 1xSerum: amber 4.9ml | Spin, separate and freeze <4hrs | N/A |
| IgG 4 (IgG Sub-classes) | 1xSerum: amber 4.9ml | Refrigerated | Consultant |
| IgG Subclasses Profile | 1xSerum: amber 4.9ml | Refrigerated | Consultant |
| Immunoglobulin A (IgA) | 1xSerum: amber 4.9ml | None | N/A |
| Immunoglobulin E (IgE) | 1xSerum: amber 4.9ml | None | N/A |
| Immunoglobulin G (IgG) | 1xSerum: amber 4.9ml | None | N/A |
| Immunoglobulin gene rearrangement studies (PCR) | Bone marrow/Fresh biopsy /paraffin section Peripheral blood 2xEDTA: pink 2.7ml | Slides and immunophenotyping/histology required. | Consultant |
| Immunoglobulin M (IgM) | 1xSerum: amber 4.9ml | None | N/A |
| Immunohistochemistry | FFPP slides on Superfrost plus slides | Telephone contact to St James to request permission to send | Consultant Pathologist |
| Immunophenotyping (peripheral blood) | 5xEDTA: pink 2.7ml | None | Consultant Haematologist |
| Influenza A & B detection | Nasal or throat swab or Sputum | Use special viral transport swab from Microbiology lab. | N/A |

EXTERNAL TESTS

| Influenza A or B antibodies | 1xSerum: amber 4.9ml | None | N/A |
|---|---|--|--------------------------|
| Insulin level | 1xSerum: amber 4.9ml | None | N/A |
| Intrinsic factor antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Intrinsic pathway screen | 2xEDTA: pink 2.7ml 6xCitrate: green 3ml | Must reach St James same day. Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Iron Latent Cap (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
| Iron levels (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
| Iron Overdose | 1xSerum: amber 4.9ml | None | N/A |
| Iron studies (TIBC, UIBC, transferrin saturation) | 1xSerum: amber 4.9ml | None | N/A |
| Islet antibodies | 1xSerum: amber 4.9ml | None | N/A |
| JAK2 - Exon 12 mutation analysis | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| JAK2 - V617F mutation analysis: PCR test | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| JCV (JC virus) | Urine | Urine sample frozen immediately. | N/A |
| Karyotyping | 2xLithium Heparin:orange 2.7ml | Consent form required | N/A |
| Keppra (levetiracetam) | 1 x Serum:amber 4.9ml | Serum must be removed from gel | N/A |
| KRAS protein (V-Ki-ras2 Kirsten rat sarcoma viral oncogene homolog) | FFPP Block | Accompanying documentation | Consultant |
| La (& Ro) antibodies | 1xSerum: amber 4.9ml | None | Consultant |
| Lamotrigine (lamictal) | 1xSerum: amber 7.5ml | Serum must be removed from gel | N/A |
| Largactil (Chlorpromazine) | 1 x Serum : white 7.5ml | Spin and freeze <4hrs. State time and strength of last dose. Do not use phase separator in tubes. | N/A |
| Lead levels | 2xEDTA: pink 2.7ml | None | N/A |
| Leptospira antibodies | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| | | | |
|--|---|--|----------------------------|
| Leucocyte / HLA antibodies | 2xEDTA: white/red7.5 ml | None | N/A |
| Leutenising hormone (LH) | 1xSerum: amber 4.9ml | None | N/A |
| Levetiracetam (keppra) | 1xSerum: amber 4.9ml | Serum must be removed from gel | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| LH (Leutenising hormone) | 1xSerum: amber 4.9ml | None | N/A |
| Lipase | 1xSerum: amber 4.9ml | None | N/A |
| Lipoprotein A | 1xSerum: amber 4.9ml | None | N/A |
| Lithium level | 1xSerum: amber 4.9ml | None | N/A |
| Liver-Kidney microsomal antibody | 1xSerum: amber 4.9ml | None | N/A |
| Lupus anticoagulant | 4xCitrate: green 3ml | Send to St James inside 4 hours of being taken. Sample must be taken after 11.00am and Hand delivered to Lab before 12 | N/A |
| Lyme disease (Borrelia burgdorferi) | 1xSerum: amber 4.9ml | None | N/A |
| Lymphocyte immunophenotyping | 5xEDTA: pink 2.7ml | None | Consultant |
| Lymphocyte subsets | 2xEDTA: pink 2.7ml | Must arrive in lab on the same day. | Consultant |
| Malaria verification | 1xEDTA: pink 2.7ml 2 unstained slides | None | Haematology Laboratory |
| Manganese level | 1xSerum: amber 4.9ml | Serum must be removed from gel | N/A |
| Measles antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Meningitis screen on child (Haemophilus influenza PCR, Neisseria meningitidis PCR & Streptococcus pneumonia PCR) | 1xEDTA: pink 2.7ml | Must reach Temple St. before 11.00hrs. | N/A |
| Meningococcal PCR (Neisseria meningitidis PCR) | 1xEDTA: pink 2.7ml | Must reach Temple St. before 11.00hrs. | N/A |
| Mercury | 1xLithium heparin: orange 2.7ml or Urine x 20mls in | None | N/A |

EXTERNAL TESTS

| | acid washed container | | |
|--|---|---|---------------------------|
| | | | |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Metabolic screen | MSU fresh specimen, frozen immediately. | Fresh urine specimen, PH urine before freezing, freeze immediately. Urine divided into plain conical tubes. Must give clinical details or not accepted. | N/A |
| Metanephrines 24 hr. urine | 24 hr urine | acidified container, pH and volume. Decant 2x10mls MSU | N/A |
| Methotrexate | 1xSerum: amber 4.9ml | None | N/A |
| Micro Array | 1xLithium heparin orange 2.7 ml 1xEDTA pink 2.7 ml | Send Ambient, Medical history required, Request form required | N/A |
| Microspora faenii (farmers' lung) | 1xSerum: amber 4.9ml | None | |
| Milk allergy | 1xSerum: amber 4.9ml | None | N/A |
| Mitochondrial antibodies. | 1xSerum: amber 4.9ml | None | N/A |
| MPO antibodies. (myeloperoxidase antibodies) | 1xSerum: amber 4.9ml | None | N/A |
| MRD studies (minimum residual disease) | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| MRSA Typing | Nutrient agar slope of organism | Refer to Consultant Microbiologist. Adhere to transport regulations for packaging. | Consultant Microbiologist |
| Multiple myeloma (FISH) | Bone marrow aspirate slides | 3 unstained unfixed smears | Consultant |
| Mumps antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Muscle pathology | On saline moistened gauze in dry container | Contact Histology MRHT Laboratory. | Consultant |
| Muscular dystrophy-1 (muscular genetics /DNA analysis) | 2xEDTA: pink 2.7 ml | Consent form needed. | Consultant |

EXTERNAL TESTS

| | | | |
|--|---|--|----------------------------|
| Mycoplasma pneumoniae antibodies | 1 x serum amber 4.9ml | None | N/A |
| MYD88 | 1x Blood Transfusion EDTA 7.5 ml | Must have completed HMDC Referral Form Minimum 5ml Blood Volume in Sample | Test Restricted to: |
| Referred Test | Sample | Special Requirements | |
| Myeloid Gene Panel | 1x Blood Transfusion EDTA 7.5 ml | Must have completed HMDC Referral Form Minimum 5ml Blood Volume in Sample | |
| Myeloperoxidase antibodies. (MPO antibodies.) | 1xSerum: amber 4.9ml | None | N/A |
| Myoglobin | 1xSerum: amber 4.9ml | None | N/A |
| Myositis Abtibodies/Markers | 1xSerum: amber 4.9ml | None | N/A |
| Nail cuttings for fungal culture | Nail cuttings | None | N/A |
| nDNA antibodies (DNA) | 1xSerum: amber 4.9ml | None | N/A |
| Neisseria meningitides PCR (meningococcal PCR) | CSF >200µl CSF- unspun Blood 1xEDTA: pink 2.7 | Must reach Temple St. before 11.00hrs. | N/A |
| Neuro Pathology | Organ removed at Autopsy | On Formalin moistened gauze. Follow organ retention tracking protocol | Consultant |
| NEURONAL ANTIBODY (HU, RI, YO, CV2, MA2) | 1xSerum: amber 4.9ml | None | Consultant |
| Neurontin (Gabapentin) | 1xSerum: amber 4.9ml | Spin, separate and Freeze inside 4 hrs | N/A |
| Neutrophil cytoplasmic antibodies | 1xSerum: amber 4.9ml | None | Consultant |
| Neutrophil elastase mutation | 2xLithium heparin orange 2.7 ml 2xEDTA pink 2.7 ml | None | Hospital Consultant |
| Norovirus (SRSV) | Stool | Contact Microbiology | N/A |
| Oestradiol level | 1xSerum: amber 4.9ml | None | N/A |
| Olanzapine level | 2xEDTA pink 2.7 ml | None | N/A |
| Oligoclonal bands | 2xCSF tubes, 1xserum: amber 4.9ml | 300µl unspun CSF and 5ml of amber tube blood | N/A |

EXTERNAL TESTS

| | | | |
|---|--|--|----------------------------|
| Organic acids | MSU | Fresh urine specimen, put in plain conical tubes and frozen immediately. Must have relevant clinical details or not accepted. | N/A |
| Osmolality | 1xSerum: amber 4.9ml or 1 x MSU | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Oxalate (urinary) | 24hr urine | acidified container, pH and volume. Decant 2x10mls MSU | N/A |
| Pancreatic polypeptide | 1ml EDTA plasma+Aprotinin e | Non haemolysed. Spin, separate and freeze <1 hr | N/A |
| Pancreatitis (acute): Carbonic Anhydrase 1 & 2 (Anti Carbonic Anhydrase antibodies & Anti Lactoferrin antibodies) | | | |
| Genetic cationic trypsinogen SPINK-1 mutation | 1xSerum: amber 4.9ml | None | |
| CFTR mutation (sent to cytogenetics in Crumlin as part of acute pancreatitis screen) | 2xEDTA: pink 2.7ml 2xEDTA: pink 2.7ml | Consent form needed. Consent form needed. | Consultant |
| Parainfluenza virus 1,2,3 antibodies | 1 x Serum amber 4.9ml | Refrigerated | N/A |
| Paraquat level | 2xSerum: amber 4.9ml 20ml urine in a sterile container | One serum on admission. Second serum taken just before sending samples to Beaumont. Ring ahead if required urgently. Qualitative test on urine takes 2/3 hrs. Quantitative test on blood takes 4 hrs. Random urine sample. | N/A |
| Parietal cell antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Parvovirus anti B19 | 1xSerum: amber 4.9ml | None | N/A |
| PB (peripheral blood) immunophenotyping | 5xEDTA: pink 2.7ml | None | Consultant |

EXTERNAL TESTS

| | | | |
|---|---|--|----------------------------|
| Penicillin G Allergy | 1xSerum: amber 4.9ml | None | N/A |
| Penicillin V Allergy | 1xSerum: amber 4.9ml | None | N/A |
| Pertussis antibodies (Bordatella pertussis) | 1xSerum: amber 4.9ml | Refrigerated | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Phenobarbatone levels | 1xSerum: amber 4.9ml | None | N/A |
| Phenytoin (Epanutin) | 1xSerum: amber 4.9ml | None | N/A |
| Phospholipid antibodies (B2-glycoprotein and cardiolipin antibodies.) | 1xSerum: amber 4.9ml | None | N/A |
| Plasma viscosity | 2xEDTA: pink 2.7ml | Must arrive in St James' on the same day. Send ambient | N/A |
| Platelet antibodies | 1 Serum:white 7.5 ml | None | Consultant Haematologist |
| Platelet refractoriness | 4xEDTA: pink 2.7 ml or 2 x Serum: white 7.5ml | None | Consultant Haematologist |
| PML RARA (AML/APL transcripts) | 2xEDTA: pink 2.7ml | Send within 24 hrs. | Consultant Haematologist |
| Pneumococcol antibody titre | 1xSerum: amber 4.9ml | None | N/A |
| Pneumococcol antibody titre for PCR | 1xEDTA: pink 2.7ml | None | N/A |
| PNH (paroxysmal nocturnal haemoglobinuria) | 2xEDTA: pink 2.7ml | None | N/A |
| Polyoma (BK virus) | 1xSerum: amber 4.9ml 1xUrine MSU | Spin, separate, freeze serum immediately. Freeze urine immediately. | N/A |
| Porphyrins | 2xEDTA: pink 2.7ml, 2xFaeces, 24hr Urine 2xLithium heparin | Cover sample containers with tinfoil before taking samples. | N/A |
| Post transfusion purpura (PTP) | 5-10ml clotted +5ml EDTA | Discuss with IBTS consultant/Haemovigilance | Consultant Haematologist |
| Preader Willi | 2x EDTA pink 2.7ml | Consent form required | Consultant |
| Pro collagen III antibodies | 1xSerum: amber 4.9ml | Spin and Freeze <4 hrs | N/A |

EXTERNAL TESTS

| | | | |
|--|--|---|----------------------------|
| Pro insulin level | 1xSerum: amber 4.9ml | Spin, separate & freeze <4hrs | N/A |
| Progesterone (Hydroxy-progesterone-17) | 1xSerum: amber 4.9ml or 1xEDTA: pink 2.7ml or 1xLith Heparin: orange 2.7ml | Send refrigerated | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Prograf (Tacrolimus) | 2xEDTA: pink 2.7ml | State date/time and strength of last dose | N/A |
| Prolactin level | 1xSerum: amber 4.9ml | None | N/A |
| Protein C & Protein S | 2xCitrate: green 3ml | Must reach St James same day. Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Protein electrophoresis (total protein, albumin, immunoglobulins, B-2 microglobulin) | 1xSerum: amber 4.9ml | None | N/A |
| Proteinase 3 ANCA (Proteinase 3 – Anti-neutrophil cytoplasmic antibodies) | 1xSerum: amber 4.9ml | None | N/A |
| Prothrombin mutation | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| Pyruvate dehydrogenase | 1xSerum: amber 4.9ml | None | N/A |
| Pyruvate kinase | 1xEDTA: pink 2.7ml | None | N/A |
| Q Fever (Coxiella burnetti) antibodies | 1xSerum: amber 4.9ml | Refrigerated | N/A |
| Quantiferon (TB) | Special bottles available from OPD ordered from MedLab Pathology. | Refer to Consultant Microbiologist. Must arrive in MedLab within 16 hours. Do not request after 10am on Fridays | Consultant |
| Red cell folate | 2xEDTA: pink 2.7ml + | Samples must not be used previously by other departments. Deliver within 24 hrs. Medlab Pathology | Consultant |
| Reducing substances | Faeces sample | Store in fridge. Freeze if not sending same day. | N/A |
| Renal pathology | 1xFormalin 1xZeus medium | Contact Histology MRHT Laboratory. | Hospital Consultant |

EXTERNAL TESTS

| | | | |
|--|--|--|----------------------------|
| Renin (& aldosterone if required) recumbent and standing | 4xEDTA: pink 2.7ml | Patient 45 min recumbant, take bloods. Patient 20mins standing, take 2nd set of bloods. Send bloods to lab as soon as they are taken after each step. Spin, separate and freeze | Consultant |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Renin (active) - random sample | 2xEDTA: pink 2.7ml | Freeze within 4 hours. | Consultant |
| Risperidone level | 1xSerum: amber 4.9ml | Spin and freeze <4 hrs. State time and strength of last dose. Do not use phase separator in tubes. | N/A |
| Ristocetin co-factor (RiCOF) | 4xCitrate: green 3ml | Must reach St James same day. Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Ro (& La) antibodies | 1xSerum: amber 4.9ml | None | Consultant |
| Rubella antibodies (antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| Rubella antibodies (non-antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| Salmonella/Shigella typing | Nutrient agar slope of organism | Adhere to transport regulations for packaging. Refer to Consultant Microbiologist. | Microbiology Laboratory |
| SARS (Severe acute respiratory syndrome causing virus) | Nasopharyngeal aspirate, sputum, stool, throat swab. | Refer to Consultant Microbiologist. By arrangement with NVRL. | N/A |
| Selenium level | 1xSerum: amber 4.9ml | Remove from gel | N/A |
| Sex hormone binding globulin | 1xSerum: amber 4.9ml | None | N/A |
| Sickle cell (see Thalassaemia) | 1xEDTA: pink 2.7ml 1xSerum: amber 4.9ml | Send FBC Result. | Consultant Haematologist |
| Sirolimus level | 2 x EDTA: pink 2.7ML | None | N/A |
| Skin IF | On saline moistened gauze in dry container | Must receive before 11 am and send by immediate transport | Consultant |
| Skin scrapings for fungal culture | Skin Scrapings | None | N/A |
| Smooth muscle antibodies | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| | | | |
|---|---|---|----------------------------|
| Sodium valporate | 1xSerum: amber 4.9ml | None | N/A |
| Somatomedin-C (IgF-1) | 1xSerum: amber 4.9ml | Spin, separate and freeze | N/A |
| Somatrophin (growth hormone) | 1xSerum: amber 4.9ml | None | N/A |
| | | | |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| SRSV (small round structured virus or Norovirus) | Fresh faeces | Refer to Consultant Microbiologist. By arrangement with NVRL. | N/A |
| STFR - (soluble transferring receptor) | 1xSerum: amber 4.9ml | None | N/A |
| Synacthen test | 1xSerum: amber 4.9ml | None | N/A |
| Syphilis -VDRL - antenatal | 1xSerum: amber 4.9ml | None | N/A |
| Syphilis -VDRL - non-antenatal | 1xSerum: amber 4.9ml | None | N/A |
| T3 or T4 (Free) | 1xSerum: amber 4.9ml | None | N/A |
| Tacrolimus (Prograf) | 2xEDTA: pink 2.7ml | None | N/A |
| Tambacor (Flecainide) | 1xSerum: amber 4.9ml | | N/A |
| TB culture | Sputum, CSF, Bone marrow or tissue | Sent untreated. | N/A |
| TB QUANTIFERON | Special bottles available from OPD ordered from MedLab Pathology. | Refer to Consultant Microbiologist. Must arrive in MedLab within 16 hours. Do not request after 10am on Fridays | Consultant |
| TBII (thyroid binding inhibitor immunoglobulin) | 1xSerum: amber 4.9ml | Spin & freeze <4hrs | N/A |
| T-cell receptor (TCR) gene rearrangement studies: PCR test | 4xEDTA: pink 2.7ml / Fresh biopsy / Paraffin sections | Slides and immunophenotyping / histology report required. | Consultant Haematologist |
| T-cell subsets - CD4/8 | 2xEDTA pink 2.7ml | Send within 24 hours. | Consultant |
| Tegretol level | 1xSerum: amber 4.9ml | None | N/A |
| Testosterone - free index | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| | | | |
|---|--|--|----------------------------|
| Testosterone level - male/ female/child | 1xSerum: amber 4.9ml | None | N/A |
| Tetanus antibodies | 1xSerum: amber 4.9ml | None | N/A |
| TFTs (TSH & Free T4 thyroid function test) | 1xSerum: amber 4.9ml | None | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Thalassaemia (Hb electrophoresis for HbA2 or HbF) | 2xEDTA: pink 2.7ml 1xSerum: amber 4.9ml | Copy of FBC results must be enclosed. | Consultant Haematologist |
| Thalassaemia (α or β genotype) | 2xEDTA: pink 2.7ml | None | Consultant Haematologist |
| Theophylline level | 1xSerum: amber 4.9ml | None | N/A |
| Thiamine (see vitamin B1) | 2xEDTA: pink 2.7ml | Must be protected from light | N/A |
| Thiopurine methyl transferase (Haem TPMT) | 2xEDTA: pink 2.7ml | None | N/A |
| Thrombin antibody | 1xCitrate: green 3ml | Must reach St James same day. Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant |
| Thrombophilia screen (Protein C & S, cardiolipin antibodies, prothrombin, lupus anticoagulant, homocysteine, antithrombin activity, factor V Leiden, factor VIII, fibrinogen) | 2xEDTA: pink 2.7ml 6xCitrate: green 3ml 1xSerum: amber 4.9ml | Must reach St James same day. Sample must be taken after 11.00am and Hand delivered to Lab before 12. Request form necessary. Paediatric bottles not sufficient. | Consultant Haematologist |
| Thyroglobulin levels | 1xSerum: amber 4.9ml | Specify if antibodies or levels required | N/A |
| Thyroid binding inhibitor immunoglobulin (TBII) | 1xSerum: amber 4.9ml | Spin, separate & freeze <4hrs | N/A |
| Thyroid peroxidase antibodies (TPO) | 1xSerum: amber 4.9ml | None | N/A |
| Thyroid receptor antibodies | 1xSerum: amber 4.9ml | Must arrive in St James' on the same day. | N/A |
| Thyroid stimulating hormone (TSH) | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| TIBC (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
|---|-----------------------------|--|---------------------|
| Tobramycin level (pre) | 1xSerum: amber 4.9ml | Spin, separate & freeze. | N/A |
| Topiramate (topamax) | 1xSerum: amber 4.9ml | None | N/A |
| | | | |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| Torch screen (CMV, Toxoplasma, Rubella, Herpes simplex) | 1xSerum: amber 4.9ml | None | N/A |
| Total Iron Binding Cap (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
| Toxacara antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Toxicology for drugs of abuse | MSU or 1xserum: amber 4.9ml | None | N/A |
| Toxoplasma antibodies. | 1xSerum: amber 4.9ml | None | N/A |
| Tpha (antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| Tpha (non-antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| TPMT (thiopurine methyl transferase) | 2xEDTA: pink 2.7ml | None | N/A |
| TPO (Thyroid peroxidase) antibodies | 1xSerum: amber 4.9ml | None | N/A |
| Transferrin receptor (STFR-soluble transferring receptor) | 1xSerum: amber 4.9ml | None | N/A |
| Transferrin saturation (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
| Transfusion related acute lung injury-TRALI | 2xEDTA: white/red 7.5 ml | Discuss with IBTS Consultant/Haemovigilance. Forward to QC Lab | N/A |
| Treponema pallidum (tpha) antenatal | 1xSerum: amber 4.9ml | None | N/A |
| Treponema pallidum (tpha) non antenatal | 1xSerum: amber 4.9ml | None | N/A |
| Trileptal levels | 1xSerum: amber 4.9ml | Spin and freeze <4 hr | N/A |
| Tryptase | 1xSerum: amber 4.9ml | None | N/A |

EXTERNAL TESTS

| TSH (thyroid function tests-TSH & Free T4) | 1xSerum: amber 4.9ml | None | N/A |
|--|-------------------------------|--|---------------------|
| TSH receptor antibodies | 1xSerum: amber 4.9ml | None | N/A |
| | | | |
| | | | |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| tTG antibodies (tissue transglutaminase antibodies/alpha gliadin antibodies) | 1xSerum: amber 4.9ml | None | N/A |
| UIBC (see iron studies) | 1xSerum: amber 4.9ml | None | N/A |
| Urinary Citrate | 24 hr Urine (non acidified) | Volume noted. 3x10ml sent for test Freeze | N/A |
| Urinary Cortisol | 24 hr Urine (non acidified) | Volume noted. 2 X MSU sent for test. | N/A |
| Urinary osmolality | MSU - random MSU 1x10mls | None | N/A |
| Urine 24h Electrophoresis | 24 hr Urine (non acidified) | None | N/A |
| Urine SPE (electrophoresis) | Urine MSU | None | N/A |
| Valporate | 1xSerum: amber 4.9ml | None | N/A |
| Vanillylmandelic acid (VMA) | 24 hr Urine - with HCl | pH & volume noted. 2x10mls sent for test | N/A |
| Varicella antibodies | 1xSerum: amber 4.9ml | None | N/A |
| VDRL (antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| VDRL (non-antenatal) | 1xSerum: amber 4.9ml | None | N/A |
| Venlafaxine | 1xSerum: amber 4.9ml | Spin and freeze <4 hrs | N/A |
| VIP (vasoactive intestinal polypeptide) | 1 mL EDTA plasma + Aprotinine | Non haemolysed. Spin, separate and freeze <1 hr | N/A |
| Viral Screen (must specify tests) | 1xSerum: amber 4.9ml | Doctor must specify test required | N/A |
| Vitamin A | 1xSerum: amber 4.9ml | Cover tube in tinfoil. Spin & freeze within 4 hr | N/A |
| Vitamin B1 (thiamine) | 2xEDTA: pink 2.7ml | Protect from light | N/A |
| Vitamin B12 & Folic acid | 1xSerum: amber 4.9ml | None | N/A |
| Vitamin B6 | 2xEDTA: pink 2.7ml | Protect from light | N/A |

EXTERNAL TESTS

| Vitamin C | 2 X Lithium Heparin | Cover tube in tinfoil. Spin, separate + freeze within 1 hour | N/A |
|--------------------------------------|--|--|--------------------------|
| Vitamin D (25-OH) | 1xSerum: amber 4.9ml | No need to cover with tinfoil | N/A |
| Vitamin E | 1xSerum: amber 4.9ml | Cover tube in tinfoil. Spin, separate & freeze within 1 hr | N/A |
| Vitamin K | 1xSerum: amber 4.9ml | Protect from Light, no need to freeze | N/A |
| Referred Test | Sample | Special Requirements | Test Restricted to: |
| VMA (vanillylmandelic acid) | 24 hr Urine - with HCl | pH & volume noted. 2x10mls sent for test | N/A |
| Von Williebrand factor (vWF:Ag) | 2xEDTA: pink 2.7ml 6xCitrate: green 3ml 1xSerum: amber 4.9ml | Sample must be taken after 11.00am and Hand delivered to Lab before 12 | Consultant Haematologist |
| Xanthochromia | CSF supernatant | >1ml of CSF supernatant and amber tube blood. Refer to Consultant Microbiologist | Hospital Consultant |
| Yersinia | 1xSerum: amber 4.9ml | None | N/A |
| YO antibodies (HU, RI, YO, CV2, MA2) | 1xSerum: amber 4.9ml | None | Consultant |
| Zinc | 1xSerum: amber 4.9ml | Remove serum from gel | N/A |

3. REPORTS ISSUED BY EXTERNAL LABORATORIES

Hard Copy Resulting

External reports produced by referral labs are returned by hard copy report to the External test Department for sorting and return to the test requestor. The category under which each test result should be filed in the patient's chart is indicated in the index at the back of this manual. A scanned copy of the report is retained on the Laboratory DART system for archive purposes.

Electronic Resulting

In addition to hard copy reports, IT links exist with the sites listed below to improve access to external reports for our service users.

- The MRHT Laboratory Information system (LIS) is linked with the Regional Hospital Mullingar (RHM) Laboratory via an IT interface that transmits request and result messages between the sites. Results for external requests sent to RHM Laboratory are accessible from MRHT LIS and Ward Enquiry systems

- The MRHT LIS is also linked with St James Laboratory (SJH) and the National Virus Reference Laboratory (NVRL) via an IT messaging system. This system transmits request and result messages between the sites. Results for external requests sent to SJH* and NVRL are accessible from MRHT LIS and Ward Enquiry systems.

Note: Not all SJH tests are transmissible electronically. Some text based and molecular tests reports are returned via hard copy only.

Master Copy

HAEMATOLOGY LABORATORY



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5. SAMPLE RETENTION

6. QUALITY ASSURANCE

1. INTRODUCTION

The Haematology Laboratory at Midland Regional Hospital, Tullamore provides a routine haematology service to the hospital and to general practitioners in the local area. In addition, a referral service for more specialised haematological tests is provided.

An on-call service is provided to the hospital only for processing of non-deferrable/urgent test requests. Routine test requests should not be forwarded to the laboratory during on-call hours.

2. HAEMATOLOGY & COAGULATION TEST INDEXES

(For details of tests accredited to ISO: 15189, refer to the Irish National Accreditation Board (INAB) Website scope of accreditation registration number 221MT)

2.1 HAEMATOLOGY TEST INDEX

HAEMATOLOGY:

Automated Differential White Cell Count
Blood Film Examination
Erythrocyte Sedimentation Rate (ESR)
Full Blood Count (FBC)
Infectious Mononucleosis Screen (I.M.)
Malaria Rapid Diagnostic Test/Blood Smear for parasites
Reticulocyte Count
Sickle Cell Screen

2.2 COAGULATION TEST INDEX

COAGULATION:

Prothrombin Time (PT)
International Normalised ratio (INR)
Activated Partial Thromboplastin time (APTT)
Activated Partial Thromboplastin time Ratio (APTT Ratio)
Coagulation Screen (PT and APTT)
D-Dimers
Fibrinogen
Mixing Studies (only at the request of Consultant Haematologists)

3. HOURS OF OPERATION AND CONTACT DETAILS

| Postal Address | Hours of Operation | Phone (internal EXT in bold) |
|---|---|--|
| Haematology Laboratory MRHT Tullamore Co Offaly Ireland | Opening hours Monday – Friday: 08:00 - 20:00 Routine service: 09:00-17:00 On call service from 20:00 to 08:00 the following day. Sat/Sun/Public Holidays On call service provided over 24 hours | 057-93 58351 057-93 58347 On Call hours via switch EXT 3000 |

| Haematology Personnel | Name | Contact Details |
|--------------------------|-------------------|---|
| Consultant Haematologist | Dr. Gerard Crotty | 057 93 58352 Gerard.crotty@hse.ie (Consultant Haematologist on call can be contacted through switchboard Ext. 3000) |
| Consultant Haematologist | Dr. Kanthi Perera | 057 93 58276 Meegahage.perera@hse.ie (Consultant Haematologist on call can be contacted through switchboard Ext. 3000) |
| Haematology Team | | Contact via switchboard Ext. 3000 |
| Chief Medical Scientist | Ms. Áine Ryan | 057-93 58309 Aine.gorman@hse.ie |
| Senior Medical Scientist | Ms. Helena Martin | 057-93 58351 HelenaT.martin@hse.ie |

| General Enquiries | |
|-------------------|---------------------|
| Haematology | 057-93 58351 |
| Coagulation | 057-93 58347 |

4. PRE-TESTING INFORMATION

4.1 HANDLING AND TRANSPORT OF SAMPLES

All samples are to be taken into the correct specimen tubes and transported to the laboratory in the Biochemistry/Haematology Request Form specibag during routine hours and in the Haematology On-call Request Form specibag during on-call hours.

All routine haematology/coagulation tests can be stored at room temperature provided that they are delivered within the detailed times in section 4.3 Tables 1 and 2.

To protect the safety of all healthcare staff, the following precautions for the transportation of samples must be followed:

- The outside of the sample tube must not be contaminated with blood/body fluids.
- Blood or body fluid-stained laboratory request forms must not be submitted.
- Samples must be placed in the plastic bag that is attached to the request form.
- Samples can be transported to the laboratory at room temperature unless otherwise stated in the sample requirements section.
- High risk/ known infectious patients should be clearly indicated on the request form.

4.2 FORM AND SAMPLE LABELLING REQUIREMENTS

All parts of the General Biochemistry/Haematology Request form or Haematology On-call Request form and specimens are to be completed in full as per the labelling requirements stated in **Section 7** of the **General Information Section** at the beginning of this manual.

Please reference the Biochemistry section for the General Biochemistry/Haematology Request Form. See below for the Haematology On-call Request form:

4.3 SAMPLE REQUIREMENTS FOR ROUTINE HAEMATOLOGY AND COAGULATION TESTS

As per section 3.1 of the General Information, the routine opening hours are 08:00 – 20:00 hrs Monday to Friday with emergency on-call service provided outside of these hours and Saturdays, Sundays and Public Holidays. Please note Specimen Reception closes at 17:45 during routine days.

Please refer to the following tables for the Haematology sample requirements.

Table1: Routine Haematology Tests

| Test Name | Sample type & volume | Special Conditions | Reporting Timeframe (Routine hrs) |
|--|-----------------------|---|------------------------------------|
| Full Blood Count (FBC) | EDTA (pink) 2.7 ml | 72 hours maximum from sample collection | Daily |
| Automated Differential White Cell | EDTA (pink) 2.7 ml | 72 hours maximum from sample collection | Daily |
| Blood Film Examination | EDTA (pink) 2.7 ml | EDTA sample must be <24 hrs old. Reason for request must be provided | 72hrs |
| Erythrocyte Sedimentation Rate (ESR) | EDTA (pink) 2.7 ml | One sample only required for FBC & ESR but must be filled to the correct level. 24 hours maximum from sample collection | Daily |
| Reticulocyte Count | EDTA (pink) 2.7 ml | 6 hours maximum from sample collection | Daily |
| Infectious Mononucleosis Screen (I.M.) | EDTA (pink) 2.7 ml | One sample only required for FBC and I.M. | Up to 16:00 daily |
| Malaria Rapid Diagnostic Test / Blood Smear for parasites | EDTA (pink) 2.7 ml | Sample to be taken during fever spike. Haematology laboratory must be contacted in advance. | Daily |
| Sickle Cell Screen | EDTA (pink) 2.7 ml | Haematology laboratory must be contacted in advance. | Daily (for in house patients only) |

Notes: Most samples are processed as they arrive in the laboratory.

Infectious Mononucleosis tests are processed twice daily in the morning and evening.

Non-urgent samples arriving after routine hours will be analysed on the next routine working day.

Table 2: Routine Coagulation Tests

| Test Name | Sample type & volume | Special Conditions & Clinical Details | Reporting Timeframe (Routine hrs) |
|--|-----------------------------|--|-----------------------------------|
| Prothrombin time (PT)/INR | Sodium Citrate (green) 3ml | Sample must be filled to the correct level. State if patient is on Warfarin. Max delivery time from Phlebotomy <24hrs | Daily |
| Activated Partial Thromboplastin time (APTT) / APTT Ratio | Sodium Citrate (green) 3ml | Sample must be filled to the correct level. State if patient is on Heparin. Max delivery time for non heparin from Phlebotomy <24hrs and heparinised <2hrs | Daily |
| Coagulation Screen (PT and APTT) | Sodium Citrate (green) 3ml | Sample must be filled to the correct level. State if any anticoagulant therapy | Daily |
| D-Dimers | Sodium Citrate (green) 3ml | Sample must be filled to the correct level. Clinical details must accompany test request. Max delivery time from Phlebotomy <8hrs. | Daily |
| Fibrinogen | Sodium Citrate (green) 3 ml | Sample must be filled to the correct level. State relevant reason for test request. Max delivery time from Phlebotomy <8hrs | Daily |
| Mixing Studies | Sodium Citrate (green) 3 ml | Sample must be filled to the correct level. Only processed at the request of Consultant Haematologist Teams. Max delivery time from phlebotomy <24hrs. | Daily |

Other non routine Haematology associated tests such as B12/Folate/Ferritin and non routine coagulation tests are referred to an external laboratory. Details of external request procedures are provided in the relevant area of this handbook.

Table 3: Turnaround Times for Haematology Tests

Note: All times from receipt of sample / not time of venepuncture

| Test Name | Routine | Priority | Critical* |
|---------------------------------|---------|----------|-----------|
| FBC | 2 hrs | 1 hr | 0.5 hrs |
| Auto WBC Diff | 2 hrs | 1 hr | 0.5 hrs |
| Reticulocyte | 2 hrs | 1 hr | 0.5 hrs |
| Blood Film | 72 hrs | * | * |
| Infectious Mononucleosis Screen | 12 hrs | n/a | n/a |
| Malaria Rapid Diagnostic Test | 2 hrs | 2 hrs | 1 hr |
| Malaria films | 6 hrs | 4 hrs | 4 hrs |
| Sickle Cell Screen | 4 hrs | 2 hrs | 1 hr |
| ESR | 4 hrs | n/a | n/a |
| PT/INR | 2 hrs | 1 hr | 1 hr |
| APTT/ APTT Ratio | 2 hrs | 1 hr | 1 hr |
| Fibrinogen | 2 hrs | 1 hr | 1 hr |
| D-Dimer | 2 hrs | 1 hr | 1 hr |
| Mixing Studies | 2 hrs | 1 hr | 1 hr |

*** Please note that the laboratory must be contacted directly for all Critical samples and priority & critical blood film requests**

4.4 REQUESTING SPECIAL HAEMATOLOGY AND COAGULATION TESTS

All special haematology requests should be made in consultation with the Haematology Consultant(s). Please contact a member of the Haematology team in advance of requesting special Haematology tests.

For management of bleeding and excessive anticoagulation see Blood Bank section of this manual.

4.5 REQUESTING BONE MARROW INVESTIGATIONS

All bone marrow investigations are performed by the Haematology Team only. A member of the Haematology Team should be contacted for referral of the patient. Bone Marrow trephines should be collected into 10% formalin which is available from the Histology Laboratory.

For cytogenetic testing, please ensure that the relevant form 'Request for Haematology/ Oncology Cytogenetic Analysis' accompanies the Histology request form. These are available from the laboratory or can be downloaded from www.genetics.ie

For Cancer Molecular Diagnostics (CMD) please ensure that the relevant form accompanies the Histology request form. These are available to download from <http://www.stjames.ie/media/Cancer%20Molecular%20Diagnostics%20request%20form.pdf>

FISH for Multiple Myeloma patients are referred to Sheffield Children's NHS Foundation Trust. Please ensure at least 2 – 3 ml of bone marrow aspirate is collected into a 7.5ml EDTA (blood transfusion) tube. Samples can only be taken Monday to Wednesday, please ensure specimen reception is contacted before 12pm to organise transport. The optimal time to take these samples is between 11:30am-12:30pm to ensure they are received at the referral site within 24hours. The plasma cell count must be reported to Sheffield before analysis will commence. Please complete the "Sheffield Diagnostics Genetics Service" referral form. These are available on <https://www.sheffieldchildrens.nhs.uk/refer-to-us/>

5. SAMPLE RETENTION

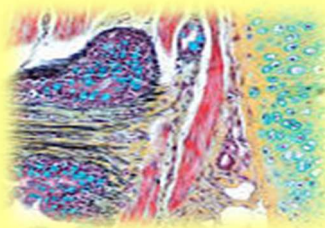
| Sample | Retention Time |
|-----------------------------|----------------|
| FBC Samples | Min 4 days |
| Coagulation Samples | Min 7 days |
| ESR Samples | Min 4 days |
| Blood Films | Min 1-2 months |
| Bone Marrow Aspirate slides | Minimum 30yrs |

6. QUALITY ASSURANCE

The Haematology Laboratory participates in the following Quality Assurance Schemes

| Distributor | QA Programme |
|---|--|
| UK National External Quality Assessment Scheme (NEQAS) | 1. Full Blood Count 2. Reticulocytes 3. Automated WBC Differential |
| Irish External Quality Assessment Scheme (IEQAS) | 4. Blood Films 5. ESR 6. Infectious Mononucleosis |
| LabQuality External Quality Assessment Scheme | 7. Blood Films for Blood Parasites 8. Sickle Cell 9. Coagulation: |
| Randox International Quality Assessement Scheme (RIQAS) | PT / INR / APTT Fibrinogen / D-Dimers |

HISTOPATHOLOGY LABORATORY



CONTENTS

1. HISTOPATHOLOGY TEST INDEX

2. INTRODUCTION

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4.3 SAMPLE REQUIREMENTS FOR HISTOLOGY TESTS

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6. SAMPLE RETENTION

7. QUALITY ASSURANCE

1. HISTOPATHOLOGY TEST INDEX

(For details of tests accredited to ISO: 15189, refer to the Irish National Accreditation Board (INAB) Website scope of accreditation registration number 221MT)

Frozen Sections
Immunohistochemistry
Non Gynae Cytology
Post Mortem Histology
Routine Surgical Histology
Special Stains
Referral Tests: Immunofluorescence
Muscle Biopsies
Renal biopsies

2. INTRODUCTION

The Histopathology Laboratory located at Midland Regional Hospital, Tullamore is the central Histopathology Laboratory servicing the HSE Mid Leinster area. In addition, a referral service for more specialised histopathology tests is provided. For reasons of patient safety, compliance with sample and form labelling requirements as described in section 4 is strongly recommended.

3. HOURS OF OPERATION AND CONTACT DETAILS

| Postal Address | Hours of Operation | Phone (internal EXT in bold) | Fax |
|---|---|---|---------------------|
| Histology Laboratory MRHT Tullamore Co Offaly | Mon – Fri 08:00- 18:00 Routine service from 09:00 – 17:00 No on call service is provided. | 057-93 58338 | 057-93 59394 |
| Histopathology Personnel | Name | Contact Details(Consultant Histopathologist on call can be contacted through switch 0579321501 or 3000) | |
| Consultant Histopathologist Staff | Dr. Margaret Lynch | 057 93 58383 Margaret.lynch@hse.ie | |
| | Dr. Nurul Nor | 057 93 58279 Nurul.norr@hse.ie | |
| | Dr Charles d'Adhemar | 057 93 59377 Charlesj.dadhemar@hse.ie | |
| | Dr. Miriam Walsh | 057 93 58278 Miriam.walsh@hse.ie | |
| | Dr Nazia Faheem | 057 93 57763 Nazia.faheem@hse.ie | |
| Chief Medical Scientist | Ms. Naomi Cronin | 057-93 58389 Naomi.cronin@hse.ie | |
| Senior Medical Scientist | Ms Margaret Kelly | 057-9358338 Margaret.kelly8@hse.ie | |

HISTOPATHOLOGY

| | | |
|------------------------------|------------------|--|
| Senior Medical Scientist | Ms. Brid Maher | 057-935 58338 Brid.maher@hse.ie |
| Senior Medical Scientist | Ms Fiona Murtagh | 057-935 58338 Fiona.murtagh@hse.ie |
| General Enquires | | |
| Histopathology Office | | 057-9358342 / 057-9359393 |

4. PRE-TESTING INFORMATION

4.1 HANDLING AND TRANSPORT OF SAMPLES

To protect the safety of healthcare staff, the following precautions for the transportation of samples must be followed:

1. Sample containers must be sealed correctly. Ensure that screw caps are fully closed. Formalin is a chemical preservative that presents a number of hazards. In case of a spillage please follow chemical spill guidelines. If no guidelines are available please contact the laboratory for instructions.
2. Samples must be placed in a biohazard bag (where size allows) and the accompanying form placed in the designated pouch.
3. Samples can be transported to the laboratory at room temperature.

4.2 FORM AND SAMPLE LABELLING REQUIREMENTS

All parts of the Histopathology request form are to be completed in full. Failure to comply with this requirement will result in sample processing being delayed while a member of the relevant team comes to the laboratory to complete the request form.

| | | | | | |
|---|-------------|--|---|------------------------|--|
| TTHSLP/001-01.V.01 | | Health Service Executive - Baile Átha Cliath & Lár Laighin - Dublin Mid-Leinster | | 01/2/2020 | |
| MIDLAND REGIONAL HOSPITAL AT TULLAMORE - REGIONAL HISTOPATHOLOGY LABORATORY | | | | | |
| SURNAME: | FIRST NAME: | DOB | Day / Mth / Year | LAB. No. | |
| PID NO.: | WARD: | SEX | M F | | |
| ADDRESS.: | HOSPITAL: | STATUS | PRIVATE <input type="checkbox"/> ELIGIBLE <input type="checkbox"/> | | |
| CONSULTANT: | | COLLECTION | Day / Mth / Year | RECEIVED DATE AND TIME | |
| Date | | | | | |
| NB: ESSENTIAL INFORMATION REQUIRED | | | | | |
| NATURE OF SPECIMEN | | | | | |
| CLINICAL DETAILS | | | | | |
| REQUESTING DOCTOR | | MCRN | | BLEEP NO. | |
| (DOCTOR FILLING IN REQUEST FORM) | | | | | |
| LAB USE ONLY: | | | | | |
| GROSS | | | | | |

All writing on the request form must be clearly legible (block capitals preferred) so that the information provided is legible, thus ensuring proper identification of the patient and all tests requests. Writing should be in

ballpoint pen (not marker) to ensure the information is copied through to each sheet of the request form.

Note: Computer generated labels may be used on the request form (**one label required on each sheet of the request form**). **Do not use the pre-printed specimen/tube label for the request form as this does not have all of the information required for registration on the Laboratory Computer System.**

Information Required on the Request Form

- a) **Patient Surname and First Name/s (unabbreviated).**
- b) **Patient date of birth.**
- c) **Patient hospital ID (Chart Number)** for patient in hospital, if available.
- d) **Ward/GP Location.**
- e) **Consultant/GP Name.**
- f) **Patient Gender.**
- g) **Date of Specimen.**
- h) **Time of Specimen, if appropriate.**
- k) **Specimen type and anatomical site of origin.** Required for all specimens sent to the Histopathology laboratory.
- l) **Patient full address. NB for GP samples especially**
- m) **Clinical details/Medications.**
- n) **Doctor's signature and bleep number**

Correct identification of the patient before collection of the sample is essential.

Samples are to be labelled as per the labelling requirements stated in **Section 7** of the **General Information section** of this manual.

Note: A computer generated label is only to be used on the sample if it can be applied without overlap to the specimen container. Current Hospital Addressograph labels are acceptable

Information Required On the Specimen

- a) **Patient surname and first name/s, (first name unabbreviated, if possible).**
- b) **Patient date of birth.**
- c) **Patient hospital ID (Chart Number)** for patient in hospital
- d) **Date of specimen collection.**
- e) **Time of specimen collection.**
- f) **Ward/GP Location.**
- g) **Specimen type and anatomical site of origin.**

4.3 SAMPLE REQUIREMENTS FOR HISTOLOGY TESTS

FROZEN SECTIONS

- **Frozen sections must be pre-booked with the Histopathology Laboratory.** Contact the laboratory directly at 05793 58338.
- The scientific staff answering the call will ask specific questions relating to the sample and will check that a Histopathologist is available at the stated time before confirming the booking.
- Please contact the Histopathology Laboratory again on the day of the surgery to confirm that the frozen section is going ahead.

Sample Requirements

- Samples must be sent in a dry container (no fixative) via a porter to the Histopathology laboratory and handed to technical staff.
- Please write a contact number on the request form for telephoned report.

Turnaround Time

- Frozen Sections are regarded as critical samples and normal turnaround time for frozen sections is 30 min after arrival in the laboratory. Occasionally samples where interpretation is difficult may take longer. Where multiple samples are received the turnaround time will be a multiple of this time as only one frozen section can be handled at any one time

Cancellation or postponement

- It is important to contact the Histopathology laboratory if the frozen section is no longer required, is being postponed or is delayed, as laboratory staff will be on hold waiting for its arrival.

ROUTINE HISTOLOGY

Specimen Requirements

- Samples for routine Histopathology must be fixed in formalin
- Pre-filled pots are available from the laboratory for smaller biopsies
- Large specimens and organs should be sent in large containers with added 10% formalin
- For very large containers, contact the Laboratory directly and larger containers will be provided.
- Ensure that the containers used for larger samples are sufficient for the sample and have twice the volume of formalin to sample
- Samples should be clearly labelled with patient and specimen details.
- **For larger containers this information should be on both the lid and the side of the container. Please note it is not sufficient to attach the request form to the specimen bucket**

Urgent Samples

- Urgent samples should be clearly marked on the request form

- A telephone call to the laboratory alerting staff to the urgency of the sample is appreciated.

Turnaround Time

Urgent samples:

- Turnaround time for urgent processing is **3-5** working days after sample receipt but is dependent on the complexity of the case. A preliminary report is usually telephoned within 2 days.

Non urgent samples:

Specimen turnaround time follows the categories used in the National Histopathology Quality Assurance Programme as follows:

| Category | Example Sample types | Turnaround Time / working days |
|----------|--|--------------------------------|
| P01: | Small biopsies such as skin punch biopsies, vocal cord bx's Needle biopsies, Pipelle biopsies, lung biopsies Prostate needle biopsies | 5-7 |
| P02: | Endoscopy samples only | 5-7 |
| P03: | Cancer Resections including GI, Thyroid, Gynae etc | 7-10 |
| P04: | All Other samples including skin biopsies, currettings Products of conception non cancer GI resections, Non cancer Gynae resections, appendix Gallbladder | 7-10 |
| P04 | Placenta | 21 |

FRESH LYMPH NODES

(PLEASE PRE-BOOK)

- **Lymph Nodes must be pre-booked with the Histopathology Laboratory.** Contact the laboratory directly at 05793 58338
- The scientific staff answering the call will ask specific questions relating to the sample and will check that a Histopathologist is available at the stated time before confirming the booking
- Contact the laboratory again when sending down the sample.
- For samples from Portlaoise and Mullingar the samples must be sent directly to the laboratory without delay to prevent sample deterioration.

- **This service only applies in routine working hours.** If the lymph node tissue is taken out of hours, bisect it and place it in 10% formalin and send it to the lab as with all other histology samples.
- **NB: Suspected TB/HIV samples** Fresh lymph node is not acceptable in the histology laboratory if it is likely to be infectious e.g. if taken from a patient who is probably TB or HIV positive. If this patient status is known or suspected, then bisect the lymph node and place it in 10% formalin. Write the relevant clinical details on the form and send the sample to the histology lab.

Specimen Requirements

- The specimen must be sent to the laboratory in a dry container (no fixative)
- The lymph node will be examined, described and impression smears made before the specimen is processed for routine Histopathology.

Turnaround Time

- A preliminary report may be telephoned to the clinical team on the day of biopsy
- The turnaround time for full report on lymph node is the same as routine biopsy

FLUID CYTOLOGY INCLUDING TBNA, SPUTA AND BRUSHINGS

Specimen Requirements

- Fluid Cytology samples should be sent to the laboratory without any fixative being added
- Separate samples must be submitted if Biochemistry and Microbiology is also required.
- Large aspirates must be aliquoted into representative samples comprising not more than 2 universal containers
- Outside of normal laboratory working hours samples should left in the laboratory fridge

Turnaround Time

- Turnaround time for cytology varies with sample.
- Reporting of routine samples **may take 5-7** working days.
- Reporting may take additional time (up to **12** working days) if Immunohistochemistry or special stains are required.
- Occasionally a case may require referral for second opinion in which case further time will be needed
- Should the report take longer than the routine turnaround time the reporting Histopathologist will be happy to discuss the progress of the report at any stage

FINE NEEDLE ASPIRATION (FNA) CYTOLOGY

Fine needle aspiration is a form of diagnostic biopsy that uses fine needles to obtain cellular samples. Upon examination of the patient in the clinic and identification of a lesion, the ENT Consultant will phone the laboratory to request a Medical Scientist to attend for FNA.

Specimen Requirements

- It's important that the correct needle size is used, preferably 23 to 25 gauge (no larger) with suction and movement back and forth within the lesion, preferably with a 10 ml syringe, with release of negative pressure prior to exiting the lesion. It is advisable to do three separate passes.
- At the clinic, the Consultant should inform the Medical Scientist of the number of sites to be sampled
- The lesion is aspirated two to three times depending on the cell yield from each pass
- The Consultant passes the syringe to the Medical Scientist
- The Medical Scientist is responsible for preparing the slides at the clinic once the site has been sampled
- If the cell yield is low, the medical scientist will request that the lesion is sampled again until there is adequate material for diagnosis
- A new needle is used for each pass

Turnaround time

- For urgent samples at least a provisional verbal report is available on the day following receipt provided that the sample is received prior to 3 pm. Reporting of routine samples takes approximately **7-10** working days.
- Reporting may take additional time (up to **12** working days) if Immunohistochemistry or special stains are required.
- Occasionally a case may require referral for second opinion in which case further time will be needed
- Should the report take longer than the routine turnaround time the reporting Histopathologist will be happy to discuss the progress of the report at any stage

GYNAECOLOGICAL CYTOLOGY

Gynaecological cytology samples are referred to the laboratory in the Rotunda Hospital. The samples are referred as follows depending on the hospital from which they originate.

- **MRH @ Tullamore:** Samples are sent by the wards involved to the referral laboratory (Rotunda Hospital) and are not sent to the Tullamore laboratory for dispatch.
- **MRH @ Mullingar:** Samples are sent to the Mullingar laboratory. The details are recorded and the samples forwarded to the Rotunda Hospital for reporting. Reports are issued directly from the Rotunda Hospital to the requesting clinician. No reports are available from the pathology laboratory MRH @ Mullingar. For copies of reports please contact the cytology laboratory in the Rotunda Hospital directly.
- **MRH @ Portlaoise:** Samples are sent to the Portlaoise Laboratory. The details are recorded and the samples forwarded to the Rotunda Hospital for reporting. Reports are issued directly from the Rotunda Hospital to the requesting clinician. No reports are available from the pathology laboratory MRH @ Portlaoise. For copies of reports please contact the cytology laboratory in the Rotunda Hospital directly.

Specimen Requirements

Cervical Smears- Obtain an adequate sample from the cervix using ThinPrep kit provided. Kits and instructions for sampling are available on the relevant wards. If specimens are to be posted follow the guidelines given on the kit.

Turnaround Times

- 2-4 weeks depending whether the smear is routine, is based on suspicious clinical findings or if the patient has previous positive history.
- Turnaround time for routine smears is shorter, while turnaround time for other smears is longer.

GP samples:

Gynaecological cytology samples from women aged 25-60 should be sent directly to Cervical Check. Information on the referral address is available from Cervical Check. Samples from women outside this age group and who are not previously registered with the Cervical Screening Program should be referred directly to the Rotunda Hospital.

MUSCLE BIOPSIES

(PLEASE PRE-BOOK)

Specimen Requirements

- **As this is a referral test requiring special transport, the Histopathology Laboratory (05793 58338) must be contacted to book the muscle biopsy at least 24 hours in advance.**
- The person contacting the laboratory must give their own name and bleep number, the patient name, date of birth and the name of the consultant.
- The biopsy must be arranged in time to allow the sample to get to the laboratory before 11:00 hours. This is necessary to meet transport requirements.
- The biopsy must be placed on saline-moistened gauze and placed in a dry universal container (Do not use too much saline).
- Never squeeze a biopsy into a tight or narrow necked specimen container
- Please contact the laboratory promptly if the procedure has been cancelled.

Reports

- Muscle biopsies are referred to the Neuropathology Laboratory, Beaumont Hospital, Dublin.
- Reports when issued by the referral laboratory are sent to the MRHT laboratory office. Reports are then forwarded to the referring Consultant's secretary.
- Additional copies of reports are available from the referral laboratory only (01-8093134)

Turnaround Times

- Turnaround time for muscle biopsies is one week (*information provided by Beaumont Hospital*)

RENAL BIOPSIES

(PLEASE PRE-BOOK)

Specimen Requirements

- **As this is a referral test requiring special transport, the Histopathology Laboratory (05793 58338) must be contacted to book the renal biopsy at least 24 hours in advance**
- The person contacting the lab must give their own name and bleep number, the patient name and date of birth and the name of the consultant
- Biopsies must be scheduled as early as possible preferably in the morning to allow sufficient time for the sample to be sent by courier to the referral laboratory in the afternoon.
- 3 cores of tissue should be taken to ensure that there are sufficient numbers of glomeruli for examination- not less than 10 for light microscopy and immunofluorescence. This applies to native and allograft kidneys.
- Place one core into the pots in the following order
 - 1 biopsy into the Zeus pot supplied
 - The other two biopsies into the Formalin pot supplied.
- The biopsies must be put into the containers in the above order to prevent contamination of the Zeus solution by the forceps
- Make sure the cap is fastened tightly on the containers.
- The container must be labelled with patient name, DOB, Chart number (if available), and nature of specimen.
- It must be accompanied by a histology form with full patient details (Full name, DOB, MRN, Address, Consultant Name, Ward, and sample date) and including comprehensive clinical details. Make a note on the form of the time the specimen was taken.
- The form and specimen must be sent immediately to the histology laboratory.

Reports

- Renal Biopsies are referred to the Histopathology Laboratory, Beaumont Hospital
- Reports when issued by the referral laboratory are sent to the MRHT laboratory office. Reports are then forwarded to the referring consultant's secretary.
- Additional copies of reports are available from the referral laboratory only 01-8092630/ 2008

Turnaround Times:

- Turnaround time for renal biopsies varies depending on the complexity of the investigations required. 6-8 days immunofluorescence, 2-3 weeks Light Microscopy and 4-6 weeks Electron Microscopy. *(Information provided by Beaumont Hospital)*

SKIN BIOPSIES FOR IF

(PLEASE PRE-BOOK)

Specimen Requirements

- As this is a referral request, the Histopathology Laboratory (05793 58338) must be contacted to book the test at least 24 hours in advance
- The biopsy must be arranged in time to allow the sample to get to the laboratory before 11:00. This is necessary to meet transport requirements.
- Take two 4mm skin biopsies from normal skin adjacent to the lesion
- Place one in 10% formalin for routine Histopathology
- Place the other on saline moistened gauze and place this in a dry universal container for immunofluorescence
- Please ensure that the cap is securely tightened
- Both containers must be labelled with the patient name, DOB and nature of specimen.
- They must be accompanied by a Histopathology form with full patient details including comprehensive clinical details and the time the specimen was taken.
- The specimen must be sent directly to the laboratory by porter
- Please contact the laboratory promptly if the procedure is cancelled.

Reports

- Skin biopsies for IF are referred to the Immunology Laboratory, St James' Hospital, Dublin.
- Reports when issued by the referral laboratory are sent to the MRHT laboratory office. Reports are then forwarded to the referring Consultant's secretary.
- Additional copies of reports are available from the referral laboratory only (01-4162928)

Turnaround Times

Turnaround time for Immunofluorescence is 15 days. (*Information provided by St James Hospital*)

CYTOGENETICS/CHROMOSOMAL ANALYSIS

Tissue for cytogenetics/ chromosomal analysis is **NOT** processed by the Histopathology Department. There are procedures in place in the Maternity Units at MRH Mullingar and MRH Portlaoise for transport of these samples directly to the relevant referral centre. Please note that formalin fixed samples are **NOT** suitable for cytogenetics.

AUTOSPY/POST MORTEM FROM TULLAMORE

Specimen Requirements

Patient BID:

- If the patient dies before reaching the hospital contact nursing administration on 057 9358489/ 8490
- Nursing administration will arrange transport to the mortuary and will contact the coroner and the Histopathologist on call

Patient dies in Hospital and requires coroners post mortem:

- It is the responsibility of the doctor in charge to contact the coroner
- The team should then contact nursing administration: 057 9358489/8490 to arrange transport to the mortuary
- Nursing administration will also contact the Histopathologist on call to arrange autopsy

The clinician requires an in-house post mortem:

- All non-coroner and non forensic reports require next of kin consent
- The consent form is available from nursing administration 057 9358489/8490
- It is the responsibility of the relevant clinical team to contact the next of kin and arrange for the form to be signed
- A next of kin information leaflet on the autopsy process is also available from nursing administration
- Contact nursing administration also to arrange transport to the mortuary
- It is the responsibility of nursing administration to contact the Histopathologist on call to arrange autopsy

AUTOSPY/POST MORTEM FROM LONGFORD WESTMEATH

The notifications and paperwork required for the autopsy are performed by nursing administration in MRH Mullingar.

NB: Longford patients and Westmeath patients requiring autopsy must first be transferred to the mortuary in MRH Mullingar where nursing administration will process the paperwork before transfer to Tullamore.

Coroners Autopsies

Once it has been decided that the deceased person is to be transported to the Mortuary of the MRHT for autopsy, Nursing Administration staff MRHM contact the Undertaker appointed by the relevant Coroner to inform them that transportation of the remains between MRHM and the Mortuary of MRHT is required.

In most Coroner's cases it will be preferable for the identifying Garda to travel to MRHT to do the subsequent identification and to supply a copy of the C71 form to mortuary staff. On a case by case basis and in order to facilitate families in so far as is possible, the process of identification of remains to Gardai may be carried out on site at the MRHM in the presence of the Mortuary Attendant prior to transfer of remains to the mortuary MRHT. The Mortuary Attendant can then subsequently identify the body to

the Consultant Histopathologist who will be performing the autopsy if the identifying Garda is subsequently unable to attend MRHT.

House Autopsies (Non Coroner autopsies)

For non coroner autopsies Hospital **medical staff** are responsible for obtaining consent from next-of-kin. Nursing Administration MRHM check that a consent form signed by the next-of-kin is contained in the medical record prior to sending the medical case notes to MRHT. In addition to next of kin consent, requests for non-Coroner's post mortems should be accompanied by details of the cause of death, the specific question(s) that are to be answered by the post mortem examination and the scope of the examination (full or limited).

If no consent form is in the Medical case notes Nursing Administration will contact the relevant Medical team to request that they organise signed consent by the next of kin prior to the autopsy.

For all autopsies

Nursing Administration MRHM also contact their Nursing Administration Colleagues in MRHT to ensure that the Anatomic Pathology Technician (APT) / Multitask Attendant (MTA) is available. This ensures that the APT / MTA is on site at the mortuary MRHT to receive the remains.

Where possible all transfers of remains should be done during normal working hours. If a delay occurs then the Pathologist must be informed by telephone. Patient notes are transferred in a sealed envelope from MRHM to the mortuary of the MRHT. This can be done by utilising the existing inter-laboratory taxi service, by having the Mortuary assistant transport them directly when travelling from the MRHM or alternatively by giving them to the undertaker accompanying the body. The Histopathologist is notified of how the notes are being transported

The Consultant Histopathologist will be responsible for returning the medical chart to Medical Records MRHM.

Return of the Remains

Depending on individual family requests and arrangements, the remains may be transferred by the relevant undertaker to the Mortuary of the MRHM for viewing prior to the funeral taking place or may be taken directly to the funeral home of the appointed undertaker. The mortuary attendant will contact the undertaker to arrange transport

FOR ALL AUTOPSIES

Turnaround time

- Uncomplicated Post Mortem reports may take up to 6 months
- More complicated cases may take up to 12 months depending on testing required.
- Coroner's post mortem results are available from the relevant coroner's office only
- Non-coroners post mortem results are available from the consultant who requested the post mortem examination.
- The reporting Histopathologist is available to answer any questions next of kin may have relating to the report at any time

FORENSIC POST MORTEM

All forensic Post Mortems are carried out by the State pathologist or the Assistant State Pathologist. Reports for these cases are neither generated by nor available from the Midland Regional Pathology service.

REFERRALS FOR MULTIDISCIPLINARY TEAM REVIEW (MDT)/ TUMOUR BOARD

Surgical Teams /Oncology Team

- Each surgical team generates a list of patients who need to be discussed at MDT
- The surgical team brings the list to the oncology CNS who is the gatekeeper for the tumour board meetings
- The oncology CNS adds the cases to the oncology list which has already been generated by the Oncology CNS
- The amalgamated list is forwarded to the oncology secretary who in turn forwards it to the Histopathology Team
- The request should be received in the laboratory before 4 pm on Monday to allow the report to be finalised ,the slides and blocks to be retrieved and the case to be reviewed by the presenting Histopathologist

GI MDT

MRH Tullamore:

- The GI MDT is held once per month
- All requests of GI MDT review are forwarded by Dr Geraldine McCormack to Dr Nurul Nor, Consultant Histopathologist.
- The GI MDT List should be received in the laboratory before 4 pm on the Friday before the meeting to allow the reports to be finalised ,the slides and blocks to be retrieved and the case to be reviewed by the presenting Histopathologist

MRH Mullingar:

- The Mullingar GI MDT is generated by Dr Kirca's registrar/ secretary who forwards it to Dr Charles d'Adhemar and Dr Miriam Walsh Consultant Histopathologist
- The GI MDT List should be received in the laboratory before 4 pm on the Monday of the week before the meeting to allow the reports to be finalised ,the slides and blocks to be retrieved and the case to be reviewed by the presenting Histopathologist

5. SAMPLE REJECTION

Laboratory staff are only authorised to accept samples which meet the required standard. Please refer to section 8.6 Sample Rejection, in the Introduction section of this manual for further information. Adherence to specimen labelling requirements is of particular importance for Histopathology specimens as in general, it is not possible to obtain a repeat specimen.

Specimens and forms with discrepancies may be corrected by **the person who took the sample**. He/She will be requested to attend the laboratory to correct the error and sign and date the correction. Processing of the specimen will not proceed until the correction has taken place.

Rejected specimens from locations external to the hospital will be returned to that location for correction by **the person who took the sample**. In exceptional cases where the delay in processing will have a direct clinical impact on the sample quality or on the patient, the Medical team involved may be allowed to clarify discrepancies using an 'Acceptance of Responsibility Form' while the specimen remains in quarantine.

Discrepancy and correction will be recorded.
The final report of the patient's test result(s) will contain details of the correction made.

Where a dispute arises in relation to a sample, the final decision on suitability for testing will lie with the Consultant Histopathologist or Chief Medical Scientist.

6. SAMPLE RETENTION

| Sample | Retention Times |
|----------------------------------|---|
| Routine Histopathology Specimens | 5 Weeks (a minimum of 4 weeks after reporting) |
| Cytology Specimens | 4 Weeks |
| Autopsy/Post Mortem Samples | 1 year |

Some samples may be retained for longer periods at the request of the reporting Histopathologist and with the consent of the patient/next of kin where required.

7. QUALITY ASSURANCE

The Histology Laboratory participates in the following Quality Assurance Programmes;

| Distributor | QA Programme |
|--|--|
| UK National External Quality Assessment Service (UKNEQAS) | <ol style="list-style-type: none"> 1. Cellular Pathology 2. Immunohistochemistry 3. Non Gynae Cytopathology diagnostic Module 4. Bone Marrow 5. Frozen Section 6. Tissue Block |
| NordiqC External Quality Assessment Service | Immunohistochemistry |
| Dept. Histopathology, Leicester Royal Infirmary, Leicester LE1 5WW | National Specialist Dermatopathology External Quality Assurance Scheme UK and ROI |
| UK GI EQA Scheme | GI Pathology EQA Scheme |
| IEQAS | Irish EQA Scheme in General Histopathology |
| College of American Pathologists Proficiency testing | Cytology EQA Histology EQA |

The Histology Laboratory also participates in voluntary Inter-Laboratory assessment for some special stains and Immunohistochemistry

MICROBIOLOGY LABORATORY



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3. HOURS OF OPERATION AND CONTACT DETAILS

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4.3 SAMPLE REQUIREMENTS FOR ROUTINE MICROBIOLOGY TESTS

5. SAMPLE REJECTION

6. SAMPLE RETENTION

7. QUALITY ASSURANCE

1. INTRODUCTION

The Microbiology Laboratory at Midland Regional Hospital, Tullamore provides a routine microbiology service to the hospital and to general practitioners in the local area. In addition, a referral service for more specialised microbiology tests is provided.

An on-call service is provided to the hospital only for processing of non-deferrable/urgent test requests. Routine test requests and specimens should not be forwarded to the laboratory by the pneumatic chute during on-call hours.

2. MICROBIOLOGY TEST INDEX

Blood culture
Bone allograft culture
Cannulae culture
CAPD Fluid (Continuous Ambulatory Peritoneal Dialysis Fluid)
COVID-19 (SARS-CoV-2)
CPE Screening (Culture Method)
CPE Screening (PCR Method)
CSF
Ear Swabs
Eye Swabs
Faeces
Fluids
Fungal Culture and Microscopy
Genital Tract and Associated Specimens
Hepatitis and HIV viral screen
Influenza Screening (PCR Method)
Meningococcal PCR
Mouth Swabs
MRSA Screening (Culture Method)
MRSA Screening (PCR Method)
Nasal Swabs
Norovirus Screening (PCR Method)
Pregnancy Tests
Sinus Aspirate
Sputum
Throat Swabs
Tissues and Biopsies
Tuberculosis
Urine culture, Legionella and Pneumococcal antigen testing.
VRE Screening (PCR Method)
Wound swabs

3. HOURS OF OPERATION AND CONTACT DETAILS

| Postal Address | Hours of Operation | Phone (internal EXT in bold) |
|--|---|---|
| Microbiology Laboratory MRHT Tullamore Co. Offaly Ireland | <p>Opening hours Monday – Friday 08:00 - 20:00 Routine service 09:00 - 17:00</p> <p>On call service from 20:00 to 08:00 the following day.</p> <p>Sat/Sun/Public Holidays On call service provided over 24 hours</p> <p>Only samples presented to the Microbiology Laboratory before 16.30 will be assayed. Routine samples arriving after the 16.30 cut off will be analysed during the next working day.</p> <p>It is essential to inform the Microbiology Laboratory of the impending arrival of an urgent specimen. It is not sufficient to mark the sample 'urgent'.</p> | <p>0579358371</p> <p>Fax 057-9358356</p> |

| Enquiries | | |
|----------------------|--|--|
| Microbiology | General Enquiries Sputum, pleural fluids and faeces enquiries Batch Molecular Testing – SCV-2 | 057 93 58371 057 93 58508 057 93 58372 |
| Test Results | Ward Lookup is available for Microbiology test results. Please restrict phone calls for routine test results to between the hours 11.30 and 12.30 and 16.00 and 16.30 on routine working days. During Out of Hours, only emergency results are available | Urine 05793 58375 Swabs 05793 57791 Blood Cultures 05793 57788 |
| On Call staff | Microbiology requests on call | Contact via switchboard Ext. 3000 |

| Microbiology Personnel | Name | Contact Details |
|-------------------------------|-----------------------|---|
| Consultant Microbiologist | Dr. Cathal O'Sullivan | 05793 58349 086 0404894 Cathale.osullivan@hse.ie |
| Chief Medical Scientist | Ms. Rose McNerney | 057-93 58390 |

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|--|---|---|
| | | Rose.mcnerney@hse.ie |
| Senior Medical Scientist (s) | Ms. Anne Dolan Mr. Ultan Smith Ms. Fiona Hanlon | 057-93 58371 Anne.dolan3@hse.ie Ultanf.smith@hse.ie Fiona.hanlon@hse.ie |
| Specialist Medical Scientist (Molecular Microbiology) | Mr Oliver Cleary | Oliver.Cleary@hse.ie 057-93 58382 |

4. PRE-TESTING INFORMATION

4.1 HANDLING AND TRANSPORT OF SAMPLES

All samples are to be taken into the correct sample containers and transported to the laboratory in the request form bag or a biohazard bag. The pneumatic chute may be used to transport all Microbiology samples except CSF's and Bone Marrow Aspirates for TB investigation.

To protect the safety of all healthcare staff the following precautions for the transportation of samples must be followed:

1. Specimen containers should be securely closed.
2. The outside of the sample container must not be contaminated with blood/body fluids.
3. Blood or body fluid-stained request forms must not be submitted.
4. All urine samples should be placed in the plastic bag that is attached to the microbiology specimen request form.
5. Samples should be transported to the laboratory as soon as possible. If there is a delay, specimens should be refrigerated with the exception of Blood Cultures and CSF's, which should always be brought immediately to the laboratory.
6. During Out of Hours, do not send **routine** Microbiology samples via the pneumatic chute, refrigerate and send during the next available routine opening hours

Information Required On the Specimen- items **a** and **b** are essential for sample acceptance, items c to g are desirable when space allows.

- a) Patient surname and first name/s (unabbreviated).**
- b) Patient date of birth.**
- c) Specimen type and anatomical site of origin for Histopathology and Microbiology specimens, where applicable.**
- d) Date and time of specimen collection.**
- e) Ward/GP Location.**
- f) Patient hospital ID (Chart Number) for patient in hospital, if available.**
- g) Name of person who took the specimen, where applicable.**

4.3 SAMPLE REQUIREMENTS FOR ROUTINE MICROBIOLOGY TESTS

| BLOOD CULTURES | |
|------------------------------|--|
| Specimen Requirements | Aerobic bottle - Blue Anaerobic bottle – Pink |
| Sample Volume | 5 ml per bottle |
| Special Precautions | Do not remove the barcode label. Do not cover bottle barcode as this is scanned as part of the analytical process. Blood culture bottles must be transported to the laboratory immediately. The pneumatic chute may be used to transport blood culture bottles. Sample should be taken preferably before antimicrobial treatment is started. Do not refrigerate. |
| Turnaround Time | Blood cultures are monitored continuously. Positive results are telephoned as soon as available to the requesting source and a preliminary report is issued. (Microscopy Report (Gram stain) issued <2hrs of bottle flagging positive on analyser. An Interim culture report is issued at 24-48 hrs. A final culture report should be issued at 48-72 hrs. Reports are also released on Ward Enquiry. For negative cultures a report is issued after 5 days. 14 days if endocarditis is suspected. |

| BONE ALLOGRAFT CULTURE | |
|-------------------------------|---|
| Specimen Requirements | Two swabs from the graft (e.g. piece of bone for insertion) |
| Sample Volume | N/A |
| Special Requirements | Deliver to the laboratory immediately. |

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| Turnaround Time | Final report: 7 – 9 days. Interim Report released earlier if significant growth. |
|------------------------|--|

| CANNULAE CULTURE | |
|------------------------------|--|
| Specimen Types | Line tips <i>e.g.</i> CVP or Hickman lines |
| Specimen Requirements | Cannulae – Sterile universal container |
| Sample Volume | N/A |
| Turnaround Time | Final report: 2-3 working days. |

| CAPD FLUID (CONTINUOUS AMBULATORY PERITONEAL DIALYSIS FLUID) | |
|---|---|
| Specimen Type | Dialysis Fluid |
| Specimen Requirements | 50 ml in sterile, leak proof container. Dialysis bags not suitable. EDTA sample of fluid may also be sent for cell count. |
| Sample Volume | 50 ml. |
| Special Requirements | Deliver to laboratory immediately. |
| Turnaround Time | Gram stain and cell count – Same day Final Report 7-9 days. Interim Report released earlier if significant growth. |

| COVID-19 (SARS-CoV-2) PCR Testing | |
|--|---|
| Specimen Type | Nasopharyngeal swab |
| Specimen Requirements | Nasopharyngeal collection kit (available from laboratory) |
| Special Requirements | Deliver to laboratory immediately. Samples must be received before cut-off of 10 a.m weekdays (Mon-Fri). Testing at Weekends/Bank Holidays is available up to 11am. |
| Turnaround Time | Final Report: < 36 hours |
| Additional Information | <p>Please indicate clearly on request form that the test is (i) Query COVID-19 (ii) Surveillance (iii) Admission (iv) HCW Surveillance (v) LTCF screen.</p> <p>Please anticipate transfers to other hospitals and scheduled procedures in advance so testing can be carried out in a timely manner. Contact the Microbiology Laboratory if further guidance is required.</p> |

| CSF (CEREBROSPINAL FLUID) | |
|----------------------------------|--|
| Specimen Requirements | Contact Microbiology Laboratory for collection containers. |

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|------------------------------------|---|---------|------------------------|---------------------|---------------------------------|-----------------------|---------------------------------|----------------------------|--------------------------------------|
| | <p>3 sterile conical bottomed red capped containers of CSF fluid. Special sterile specimen collection packs are available in the Microbiology Laboratory. (Additional tests require 4-5 samples-discuss with lab)</p> <p>DO NOT USE URINE CONTAINERS DO NOT USE SMALL UNIVERSAL CONTAINERS INCLUDED IN CSF PACKS ON WARDS.</p> <p>IF Xanthochromia testing is required please use a Brown Tube to collect sample for this. Please phone Microbiology in advance to request tube.</p> <p>Label each container with patient's name etc. Label each container sequentially 1, 2, 3 etc. Deliver all specimens to the microbiology department immediately by hand. Do not use pneumatic chute to transport CSF samples.</p> | | | | | | | | |
| Sample Volume | A minimum volume of 1ml of sample in each container. For Mycobacterium testing, send as large a volume as possible (5ml). (Sent to reference lab). | | | | | | | | |
| Special Requirements | <p>Please alert the Microbiology laboratory by telephone to the impending arrival of the sample and to discuss clinical and treatment history of the patient. Ensure recent antibiotic history is on the request form. All tests requested MUST be clearly stated.</p> | | | | | | | | |
| Turnaround Time | <p>Processed on receipt. Microscopy report: < 2 hours Final negative culture report: 48 hours Final positive culture report: Available on completion of organism identification and antibiotic susceptibility testing.</p> | | | | | | | | |
| Biological Reference Ranges | <table border="0"> <tr> <td>Patient</td><td>Normal Leucocyte Count</td></tr> <tr> <td>Neonates (<28 days)</td><td>0-30 cells x 10⁶/L</td></tr> <tr> <td>Infants (1-12 months)</td><td>0-15 cells x 10⁶/L</td></tr> <tr> <td>Children/Adults (1 year +)</td><td>0-5 cells cells x 10⁶/L</td></tr> </table> <p>No RBCs should be present in normal CSF</p> | Patient | Normal Leucocyte Count | Neonates (<28 days) | 0-30 cells x 10 ⁶ /L | Infants (1-12 months) | 0-15 cells x 10 ⁶ /L | Children/Adults (1 year +) | 0-5 cells cells x 10 ⁶ /L |
| Patient | Normal Leucocyte Count | | | | | | | | |
| Neonates (<28 days) | 0-30 cells x 10 ⁶ /L | | | | | | | | |
| Infants (1-12 months) | 0-15 cells x 10 ⁶ /L | | | | | | | | |
| Children/Adults (1 year +) | 0-5 cells cells x 10 ⁶ /L | | | | | | | | |
| Additional Information | <p>For guidelines on PCR testing see Meningococcal PCR testing. Samples will be forwarded to appropriate external lab for additional testing such as virology, TB and oligoclonal bands where requested.</p> | | | | | | | | |

| CPE Screening (PCR Method) | |
|-----------------------------------|---|
| Specimen Requirements | Rectal Swab |
| Special Requirements | Red Copan double swabs available from the Microbiology Laboratory must be used. |
| Test Availability | Testing available only up to 18.00 weekdays and 11.00am weekends. |

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| Turnaround Time | Final report: <24 hours |
|------------------------|-------------------------|

| CPE Screening (Culture Method) | |
|---------------------------------------|---|
| Specimen Requirements | Rectal Swab |
| Special Requirements | Black Charcoal swabs available from the Microbiology Laboratory must be used. |
| Test Availability | Testing available only up to 18.00 weekdays and 11.00am weekends. |
| Turnaround Time | Final report: 24 hrs (Negative Screens) 48-72 hours (Positive Screens) |

| EAR SWAB | |
|------------------------------|---|
| Specimen Requirements | ENT thin wire swab available from Microbiology or Charcoal swab. |
| Special Requirements | Specify on request form if fungal investigations required. |
| Turnaround Time | Final bacterial report: 2-3 working days. TAT may be longer if organism susceptibilities required. Interim Report released earlier if significant growth. |

| EYE SWAB | |
|------------------------------|---|
| Specimen Type | Routine – Charcoal swab |
| Specimen Requirements | NA |
| Turnaround Time | Routine: Final report 2-3 working days. TAT may be longer if organism susceptibilities required. Interim Report released if significant growth. |

| FAECES | |
|--------------------------------|---|
| Available Test Requests | <p>C/S: Routine culture for Salmonella, Shigella, Campylobacter and E. coli 0157 species.</p> <p>(Sample will be cultured for Yersinia and Vibrio species if clinically indicated).</p> <p>Rotavirus and Adenovirus: will be tested on faeces from children ≤ 5 yrs.</p> <p>Norovirus testing is carried out in line with national guidelines.</p> <p>Cryptosporidium and Giardia: will be tested on all faeces for C/S</p> <p>Additional available tests include:</p> <p>Occult blood (1 sample only required), Ova and Parasites (Tested Externally, Hx. Of foreign travel only), Clostridium difficile and Helicobacter pylori-antigen testing</p> |
| Specimen Requirements | Fresh sample in clean faecal, leak proof container with spoon. |
| Sample Volume | Minimum volume: 1 – 2 g per test required. Please do not overfill container. |
| Turnaround Time | <p>Final Report: Negative culture: 2-3 working days</p> <p>Positive culture: 2-3 working days</p> <p>Ova, Cysts and Parasites: Tested Externally</p> <p>Clostridium difficile toxin: 24 hours.</p> <p>Rota /Adenovirus and Cryptosporidium/Giardia: Result available within 1 working day (Not done weekends or bank holidays)</p> <p>Norovirus:24 hours</p> <p>Occult blood: Result available within 1 working day (Not done weekends or bank holidays)</p> <p>Helicobacter pylori-antigen testing: Result available within 1 working day (Not done weekends or bank holidays)</p> |
| Additional Information | <p>It is most important to provide details of clinical symptoms and epidemiological settings on all request forms, especially the presence and duration of symptoms, recent travel, shellfish ingestion and previous antibiotic therapy.</p> <p>Clostridium difficile testing: Retesting of patients with confirmed CDAD is not advised for 4 weeks after initial laboratory diagnosis</p> <p>Ova, Cysts and Parasites investigation: Only done on patients with history of foreign travel or on the advice of the Consultant Microbiologist. (Sent Externally for testing)</p> <p>Samples for virology other than above are sent to the NVRL.</p> |

| FLUIDS | |
|------------------------------|---|
| Specimen Type | Joint fluid, synovial fluid, peritoneal fluid, ascitic fluid, pleural fluid. |
| Specimen Requirements | Clean sterile, leakproof, universal container. |
| Sample Volume | A minimum volume of 5 ml |
| Special Requirements | Deliver immediately to the laboratory. |
| Test Method | Samples are analysed for total white cell count, differential leucocytes count if appropriate. Uric acid crystals (joint fluids only) Gram stain Culture for pathogenic organisms. |
| Turnaround Time | Cell count/Uric acid Crystals: < 24 hours Final report: 7-9 days. Interim Report released earlier if significant growth. |

| FUNGAL MICROSCOPY AND CULTURE | |
|--------------------------------------|--|
| Specimen Type | Non Systemic Infection Skin/Scalp scrapings Nail scrapings Hair Systemic Infection All specimens |
| Specimen Requirements | Scrapings/Hair should be placed in DERMAPAK Envelopes or sterile universal containers. |
| Sample Volume | N/A |
| Special Requirements | Loose slides should not be used. Do not use fixatives. |
| Turnaround Time | Microscopy – 48 hours to 1 week Culture – Final report: 28 days Positive microscopy and positive cultures are telephoned to the requesting source. NOTE: Specimens for Fungal C/S are referred externally to the Microbiology Laboratory in MRHM for testing. |

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| Additional Information | 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 samples 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. |
| | Scalp - Specimens from the scalp 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 - 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 sample. |
| | Skin - Skin samples 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. |
| NOTE | Specimens for fungal studies are sent out externally for testing |

| GENITAL TRACT AND ASSOCIATED SPECIMENS | |
|--|--|
| Specimen Type | High Vaginal Cervical Urethral IUCD'S (Intra Uterine Contraceptive Devices) Pus |
| Specimen Requirements | High Vaginal: Charcoal Swab Cervical: Charcoal Swab Urethral: Charcoal Swab Pus, Fluids: Sterile universal container. Specific Chlamydia/Gonorrhoea Investigation: Use Chlamydia Collection Kit (Male/Female). (Available from the Microbiology Laboratory). |
| Sample Volume | N/A |

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|-----------------------------|---|
| Special Requirements | <p>Please provide relevant patient clinical details.</p> <p>Low vaginal swabs are discouraged because the presence of a high number of commensal flora makes them difficult to interpret. Only swabs sent in suitable transport medium will be processed. Swabs that are sent without transport medium may be dry and will not yield the targeted organisms.</p> <p>Specimens should be transported as soon as possible in charcoal containing transport media. If processing is delayed, refrigeration is preferable to storage at ambient temperature.</p> <p>For urethral specimens, patient should not have passed urine for at least one hour.</p> |
| Investigations | <p>Sexually Transmissible Infections(STI) investigations:</p> <p>Refer person to STI clinic</p> <p>Infections (other than STI) of the female genital tract such as: Vaginal candidosis; Vaginitis; Vulvovaginitis; Bacterial vaginosis (BV), Toxic Shock Syndrome (TSS); Septic abortion</p> <p>Type of sample required: HVS, Endocervical swab or urethral swab.</p> <p>Other infections of the female genital tract such as: Bartolinitis; Mucopurulent cervicitis;; Postpartum endometritis; Salpingitis; Pelvic inflammatory disease (PID)</p> <p>Type of sample required: Refer to Consultant Microbiologist.</p> <p>Infections (other than STI) of the male genital tract such as: Prostatitis; Epididymitis; Orchitis; Balanitis; Balanoposthitis.</p> <p>Type of sample required: Consult the Microbiology Laboratory.</p> |
| Turnaround Time | HVS/Endocervical/penile: 2-3 working days |

| HEPATITIS AND HIV VIRAL SCREEN | |
|---------------------------------------|--|
| Specimen type: | Clotted blood sample in amber capped tube. |
| Sample Volume | 5 ml |
| Test Method | Hepatitis B surface antigen Hepatitis B surface antibody Hepatitis B core antibody Hepatitis C antibody HIV antibody. |
| Turnaround Time | Samples are assayed in-house for Renal Dialysis patients if samples are received before 15:00. Special arrangements can be made for the NVRL to process urgent screens for RD patients out of hours. All other patient samples are assayed in the NVRL. In-house: <24 hrs (Mon – Fri Only) Note: Both in-house and VRL positive results will be telephoned. |
| Additional Information | Positive samples are referred to NVRL for confirmation. |

| Influenza and RSV Screening | |
|------------------------------------|---|
| Specimen Requirements | Nasopharyngeal swab (Request from Microbiology Laboratory) |
| Test availability | Testing available only up to 18.00 weekdays and 11.00am weekends during Flu season. |
| Turnaround Time | Result: <24 hours if processed in-house. 48-72 hours if processed externally. |

| MRSA SCREENING (Culture Method) | |
|--|---|
| Specimen Type | MRSA screens are performed from the following sites: Anterior Nares (both sides, using one swab only) Groin or Perineum (not both) Wounds – any skin break wound e.g. Eczema Sputum (if requested) CSU (if catheterised) Refer to Infection Control Guidelines for any further information required on the management of patients with MRSA |
| Specimen Requirements | Charcoal swab |
| Sample Volume | Urine: Minimum volume: 1 ml |
| Special Requirements | N/A |
| Turnaround time | Negative result: Final 1-2 working days Positive results: Final report 2-3 working days |

MRSA SCREENING (PCR Method)

| | |
|-------------------------------|---|
| Specimen Type | MRSA screens are performed from the following sites: Anterior Nares (both sides, using one swab only) Groin or Perineum (not both) Wounds – any skin break wound e.g. Eczema Refer to Infection Control Guidelines for any further information required on the management of patients with MRSA |
| Specimen Requirements | Red capped Copan double swab. |
| Test availability | Testing available only up to 18.00 weekdays and 11.00am weekends. |
| Additional Information | <p>Please note : This is not a substitution for standard routine MRSA screening. It's use is restricted to the following 3 groups as outlined below.</p> <p>The three settings in which the test is indicated are as follows;</p> <ol style="list-style-type: none"> 1. When the patient is admitted urgently and surgery involving the insertion of prosthetic material, e.g. hip prosthesis, is planned imminently 2. When an orthopaedic day case patient requires overnight admission and has not been recently screened for MRSA colonisation and 3. Those elective, non-prosthetic joint, patients who are currently not being screened due to staffing issues |
| Turnaround time | Result: <24 hours |

MENINGOCOCCAL PCR

| | |
|------------------------------|---|
| Specimen Type | CSF EDTA Blood sample |
| Specimen Requirements | Initial EDTA Blood taken on admission. CSF: Neat sample |
| Sample Volume | Blood: Minimum volume 2.5 ml CSF: Minimum volume 1 ml |
| Special Requirements | Deliver immediately to Laboratory. |
| Turnaround time | Meningococcal PCR results available after 24 hours Specific meningococcal group available after 48 hours On receipt of the result the Microbiology Laboratory will telephone all positive results to the requesting source. Final written report: 7 days |

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| Additional Information | Specimens are referred to the Irish Meningitis and Sepsis Reference Laboratory (IMSRL) for meningococcal PCR testing. Paired acute and convalescent sera may be submitted to the IMSRL for meningococcal antibody detection. If a suspected meningococcal rash is present: send a swab from the rash area; send scrapings from the rash site; and open the vesicles and swab the fluid. Nasal swabs may be sent to Microbiology Laboratory for culture for carriage of Meningococcus sp.. |
|-------------------------------|---|

| MOUTH SWAB | |
|------------------------------|---|
| Specimen Type | Mouth Swab |
| Specimen Requirements | Charcoal swab |
| Special Requirements | N/A |
| Turnaround time | Final Report: 2-3 working days. |
| Test Method | Routine swab: Cultured for B-haemolytic strep, Staphylococcus aureus, Yeasts. |

| PREGNANCY TEST | |
|------------------------------|--|
| Specimen Requirements | Sterile universal container |
| Sample Volume | Urine: Minimum volume 3 mls |
| Special Requirements | Early morning urine recommended |
| Turnaround Time | Urgent samples: <30 mins Routine samples: Same Day. |

| SINUS ASPIRATE | |
|------------------------------|---|
| Specimen Requirements | Sterile universal container |
| Sample Volume | Minimum volume: 1 ml |
| Special Requirements | The recovery of more fastidious organisms and anaerobes is compromised if sample culturing is delayed. Transport sample to the Microbiology Laboratory as soon as possible. |
| Test Method | Routine: Gram Stain Culture for pathogenic organisms |
| Turnaround Time | Final report: 7-9 days. Interim Report released earlier if significant growth. |

| SPUTUM | |
|-------------------------------|---|
| Specimen type: | Sputum – expectorated. Endotracheal tube specimen |
| Specimen Requirements | Sterile universal container |
| Sample Volume | A minimum volume of 1 ml |
| Special Requirements | Early morning freshly expectorated sputum is recommended for Mycobacterium species (sent to reference laboratory). Saliva and postnasal secretions are not suitable. Please state on the request form if the patient is a Cystic fibrosis patient. |
| Turnaround Time | Routine: Final report 2-3 working days. TAT may be longer if organism susceptibilities required. |
| Additional Information | Sample should reach the laboratory within 4 hours. Any delay beyond this time may allow overgrowth of Gram-negative bacilli; additionally Haemophilus species and Streptococcus pneumonia may not survive. If specimens are not processed on the same day as they are collected, interpretation of results should be made with care. |

| THROAT SWABS | |
|-----------------------------|---------------------------------|
| Specimen Type | Charcoal transport swab for C+S |
| Special Requirements | None |
| Turnaround Time | Final report 2-3 working days |

| TISSUE AND BIOPSIES | |
|------------------------------|--|
| Specimen type: | Tissue Biopsy |
| Specimen Requirements | Sterile universal container Deliver sample to the Microbiology Laboratory immediately. |
| Special Requirements | If specimen is small, place it in sterile water to prevent desiccation. Tissue samples for microbiology must not be placed in formalin. |
| Turnaround Time | Microscopy: <24 hours Final report: 7-9 days. Interim Report released earlier if significant growth. TAT may be longer if organism susceptibilities required |

| TUBERCULOSIS (TB) CULTURE | |
|----------------------------------|---|
| Specimen Type | Bone Marrow, CSF, Body Fluids, Blood Sputum, Aspirated Pus, Urine (only processed by TB laboratory if clinically indicated – Renal TB). |
| Specimen Requirements | Sterile universal container. |

MICROBIOLOGY

| | |
|---|---|
| | Specific bottles are available in the Microbiology Laboratory for bone marrow aspirates. |
| Sample Volume and Special Requirements | <p><u>Bone marrow</u>: Inoculate Bactec MycoF/Lytic blood culture bottle with as large a sample as possible (>1ml).</p> <p><u>CSF</u>: Minimum 0.5ml collected aseptically into a sterile container.</p> <p><u>Pus</u>: Aspirated into sterile container (as much as possible).</p> <p><u>Blood</u>: Inoculate 1-5ml (optimum 3mls) directly into BACTEC MycoF/Lytic blood culture bottle.</p> <p><u>Sputum</u>: Collect early in the morning on at least 3 consecutive days. A minimum of 5ml per sample. Saliva and postnasal secretions are not suitable.</p> <p><u>Urine</u>: Only processed by TB laboratory if clinically indicated. Collect the entire early morning urine on 3 consecutive days. Refer 25ml of each collection to the Microbiology Laboratory.</p> |
| Test Method | TB microscopy and culture is carried out in the TB reference laboratory, St James Hospital 01 4284211. |
| Turnaround Time | <p>Microscopy: TB stain within 24-48 hours of receipt of the sample.</p> <p>Culture: 6 weeks.</p> <p>Positive microscopy and positive cultures are telephoned to the requesting source immediately.</p> |
| Additional Information | <p>Following a positive microscopy/culture, a repeat sample is recommended.</p> <p>NOTE: An IMRL specimen request form must be completed to accompany specimens before they are sent to the IMRL.</p> |

| URINE CULTURE | |
|------------------------------|---|
| Specimen Type | MSU, CSU, Bag Specimen |
| Specimen Requirements | Sterile universal container. Place container in plastic bag attached to microbiology specimen request form. |
| Sample Volume | Minimum volume: 5 mls |
| Special Requirements | Specimens should be transported and processed within 4 hours if possible. Please state if patient is pregnant or neutropaenic on the request form. |
| Test Method | <p>Automated analyser/Manual Microscopy</p> <p>Only samples with raised WBC's, urines from pregnant women, neutropenic patients or paediatric patients will be routinely cultured.</p> <p>Semi-quantitative culture.</p> <p>Identification of significant isolates.</p> <p>Antibiotic susceptibility testing.</p> |
| Turnaround Time | <p>For microscopy negative urines, there will be a report issued stating – Urine 'Microscopy' Negative –Culture not indicated. (Automated method)</p> <p>Negative culture: 1-2 working days.</p> <p>Positive culture 2-3 working days.</p> |

| Urinary Antigens – Strep. Pneumonia Ag/Legionella pneumophila Ag | |
|---|---|
| Specimen Type | Urine |
| Specimen Requirements | None |
| Sample Volume | Urine: Minimum volume 5 ml |
| Special Requirements | Deliver immediately to Laboratory. |
| Turnaround time | 24 hrs |
| Additional Information | Reserved for ICU Patients only. If testing is required on a non-ICU patient the test request MUST first be approved by the Consultant Microbiologist. |

| VRE Screening (PCR Method) | |
|-----------------------------------|--|
| Specimen Requirements | Rectal Swab |
| Special Requirements | Red Copan double swabs available from the Microbiology Laboratory must be used. Reserved for ICU patients only. Also processed if specifically requested by IPCN or if patient is being transferred to another hospital that requires a VRE screen. This must be clearly stated on the specimen request form. |
| Test availability | Testing available only up to 18.00 weekdays and 11.00am weekends. |
| Additional Information | Processed by PCR method on the GeneXpert Platform. Patients previously positive for VRE should not be rescreened. |
| Turnaround Time | Result: <24 hours |

| WOUND SWAB | |
|-------------------------------------|--|
| Specimen type: | Skin/Superficial wound Abscesses Post operative Deep wound |
| Specimen Requirements | Charcoal swab of pus or exudate. Samples of pus in a sterile universal container preferred. |
| Sample Volume if sending pus | 1 ml of pus in a sterile universal container. |
| Special Requirements | Specimens should be transported and processed as soon as possible. |
| Turnaround Time | Final report: 7-9 days. Interim Report released earlier if significant growth. |
| Additional Information | Swabbing dry crusted areas are unlikely to be helpful. |

5. SAMPLE REJECTION

Laboratory staff are only authorised to accept samples which meet the required labelling criteria as described in **Section 4.2** above.

6. SAMPLE RETENTION

| | |
|--------------------------------------|------------|
| Swabs, sputa, fluids, faeces, urines | One week |
| CSF | One month |
| Blood cultures | 14 days |
| Serum for virology | Six months |
| COVID-19 Swabs | One week |
| Urines for pregnancy test | One week |

7. QUALITY ASSURANCE

The Microbiology Laboratory participates in the following Quality Assurance Programmes;

| Distributor | QA Programme |
|---|---|
| UK National External Quality Assessment Service | <ol style="list-style-type: none"> 1. General Bacteriology 2. Antimicrobial Susceptibility 3. MRSA 4. Clostridium difficile 5. Genital Pathogens 6. Urinary Antigens 7. Blood Donor Screen 8. Hepatitis Serology Anti-HBs 9. Viral gastroenteritis |
| IEQAS Laboratory Medicine EQA Scheme | FOB; Gram stain; H pylori Ag; Urine culture, Urine Microscopy, Synovial Fluid, Influenzae virus |
| Wales External Quality Assessment Scheme | Pregnancy Testing |
| QCMD | CPE Analysis SARS-CoV-2 |

TEST INDEX

| Test Name | Processing Internal or External | Page Ref | Category for Filing in Chart |
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| ABG (Arterial Blood Gas) | Internal | 41 | Biochemistry |
| ACE (angiotensin converting enzyme) | External | 114 | Biochemistry |
| Acetaminophen (Paracetamol) | Internal | 42 | Biochemistry |
| Acetylcholine receptor antibodies | External | 114 | Immunology |
| ACR (Urinary Albumin:Creatinine Ratio) | Internal | 66 | Biochemistry |
| ACTH (adrenocorticotrophic hormone) | External | 114 | Biochemistry |
| Activated Partial Thromboplastin time (APTT) | Internal | 146 | Haematology |
| ADAMTS 13 /Anti ADAMTS antibodies (inhibitory activity) | External | 114 | Haematology |
| ADH (ant diuretic hormone) | External | 114 | Biochemistry |
| Adrenal antibodies | External | 114 | Immunology |
| Adrenocorticotrophic hormone (ACTH) | External | 114 | Biochemistry |
| AFP (Alpha-fetoprotein) | Internal | 42 | Biochemistry |
| Alanine aminotransferase (ALT) | Internal | 44 | Biochemistry |
| Albumin | Internal | 43 | Biochemistry |
| Albumin BT | Internal | 107 | Blood Transfusion |
| Alcohol (see Ethanol) | Internal | 54 | Biochemistry |
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| Aldosterone (recumbent & standing) | External | 114 | Biochemistry |
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| Allergy tests | External | 114 | Immunology |
| Alkaline Phosphatase (ALP) | External | 43 | Biochemistry |
| ALP (Alkaline Phosphatase) | Internal | 43 | Biochemistry |
| Alpha 1 anti-trypsin phenotype | External | 115 | Biochemistry |
| Alpha gliadin antibodies (tTG/tissue transglutaminase abs) | External | 115 | Immunology |
| Alpha-fetoprotein (AFP) | Internal | 42 | Biochemistry |
| ALT (Alanine aminotransferase) | Internal | 44 | Biochemistry |
| Aluminium | External | 115 | Biochemistry |
| AMH (anti Mullerin hormone) | External | 115 | Biochemistry |
| Aminophylline level | External | 115 | Biochemistry |
| Amiodarone (cordarone) | External | 115 | Biochemistry |
| AML/APL transcripts (PML RARA) | External | 115 | Haematology |
| Ammonia | External | 115 | Biochemistry |
| Ampicillin allergy | External | 115 | Immunology |
| Amylase | Internal | 44 | Biochemistry |
| ANA (anti nuclear antibody/antibody screen) | External | 115 | Immunology |
| ANCA antibody titre & ANCA-C/P (proteinase 3- anti-neutrophil cytoplasmic antibodies) | External | 115 | Immunology |
| Androstenedione | External | 115 | Biochemistry |

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| ANF (anti nuclear factor) | External | 115 | Immunology |
| Angiotensin converting enzyme (ACE) | External | 115 | Biochemistry |
| Antenatal blood group | External | 115 | Blood Transfusion |
| Anti B19 (Parvovirus) | External | 115 | Microbiology |
| Anti Cardiolipin antibodies | External | 115 | Immunology |
| Anti CCP 9anti cyclic citrullinated peptide) | External | 115 | Immunology |
| Anti diuretic hormone (ADH) | External | 116 | Biochemistry |
| Anti gliadin antibodies (tTG/tissue transglutaminase antibodies). | External | 116 | Immunology |
| Anti glomerular basement antibodies | External | 116 | Immunology |
| Anti-Mullerin hormone (AMH) | External | 116 | Biochemistry |
| Anti phospolipid antibodies | External | 116 | Immunology |
| Anti proteinase 3 | External | 116 | Immunology |
| Anti smooth muscle Antibodies | External | 116 | Immunology |
| Anti-thrombin level | External | 116 | Haematology |
| Anti trypsin level | External | 116 | Immunology |
| Anti-Xa (DEB/diepoxybutane testing/factor 10) | External | 116 | Haematology |
| APCR (Activated protein C resistance). See thrombophilia screen. | External | 116 | Haematology |

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| APTT (Activated Partial Thrombo- plastin time) | Internal | 146 | Haematology |
| Arterial Blood Gas (ABG) | Internal | 41 | Biochemistry |
| ASOT (Anti Streptolysin-O Titre) | Internal | 46 | Biochemistry |
| Aspartate aminotransferase (AST) | Internal | 46 | Biochemistry |
| Aspergillus antibodies | External | 116 | Microbiology |
| AST (Aspartate aminotransferase) | Internal | 45 | Biochemistry |
| Atypical pneumonia screen | External | 116 | Microbiology |
| Autopsy/Post Mortem | Internal | 154 | Histology |
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| B2 Microglobulin | External | 116 | Immunology |
| B2-Glycoprotein I | External | 116 | Biochemistry |
| Bartonella (cat scratch) antibodies | External | 116 | Microbiology |
| BCR-ABL | External | 117 | Haematology |
| Benefix (Recombinant Factor IX) | External | 117 | Blood Transfusion |
| Beta Crosslaps (CTx) | Internal | 45 | Biochemistry |
| Beta HCG (serum) | External | 117 | Biochemistry |
| Bicarbonate | Internal | 46 | Biochemistry |
| Bilirubin – Direct (Conjugated Bilirubin) | Internal | 47 | Biochemistry |
| Bilirubin - Total | Internal | 46 | Biochemistry |
| BK virus (polyoma) | External | 117 | Microbiology |
| Blood culture | Internal | 173 | Microbiology |
| Blood Film Examination | Internal | 137 | Haematology |

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| Blood Group and Antibody Screen (Group and Hold) | Internal | 77 | Blood Transfusion |
| Blood Smear for parasites/ Malaria Screen | Internal | 145 | Haematology |
| Blood Transfusion Investigation | Internal | 77 | Blood Transfusion |
| BNP (Brain Natriuretic Peptide) | Internal | 59 | Biochemistry |
| Bone allograft culture | Internal | 173 | Microbiology |
| Bone marrow & blood flow cytometry | External | 117 | Haematology |
| Bone Marrow Failure | External | 117 | Haematology |
| Bone marrow immunophenotyping | External | 117 | Haematology |
| Bone Marrow Investigations | Internal | 147 | Haematology |
| Bordetella pertussis antibody | External | 117 | Microbiology |
| Borrelia burgdorferi antibodies (Lyme disease) | External | 117 | Microbiology |
| Brucella antibodies | External | 117 | Microbiology |
| Budgerigar feathers allergy | External | 117 | Immunology |
| C - Peptide levels | External | 117 | Biochemistry |
| C1 Esterase inhibitor | External | 117 | Immunology |
| C3 & C4 Complement | External | 117 | Immunology |
| CA 125 | Internal | 47 | Biochemistry |
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| CA 19.9 | Internal | 48 | Biochemistry |
| Calcitonin | External | 117 | Biochemistry |
| Calcium | Internal | 49 | Biochemistry |

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| Calprotectin | External | 117 | Biochemistry |
| Cannulae Culture | Internal | 174 | Microbiology |
| Carbamazepine level | External | 118 | Biochemistry |
| Carcinoembryonic antigen (CEA) | Internal | 49 | Biochemistry |
| Cardiac enzymes (CE) | Internal | 49 | Biochemistry |
| Cardiolipin antibodies | External | 118 | Immunology |
| Carnitine (free and total) | External | 118 | Biochemistry |
| CAPD Fluid | Internal | 174 | Microbiology |
| Cat allergy | External | 118 | Immunology |
| Catch scratch (Bartonella antibodies) | External | 118 | Microbiology |
| Catecholamines | External | 118 | Biochemistry |
| CCP antibodies (cyclic citrullinated peptide) | External | 118 | Immunology |
| CD4/8 T cell subsets | External | 118 | Haematology |
| CE (Cardiac enzymes) | External | 118 | Biochemistry |
| CEA (Carcinoembryonic antigen) | Internal | 49 | Biochemistry |
| Ceruloplasmin | External | 118 | Biochemistry |
| CF common mutations | External | 118 | Molecular Diagnosis |
| CFTR mutation (sent to cytogenetics in Crumlin as part of acute pancreatitis screen) | External | 118 | Molecular Diagnostics |
| CH100 | External | 118 | Molecular Diagnostics |
| Chitotriosidase level | External | 118 | Biochemistry |
| Chlamydia | External | 118 | Microbiology |
| Chloride | Internal | 50 | Biochemistry |

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| Chloroquine level | External | 118 | Biochemistry |
| Chlorpromazine (Largactil) | External | 118 | Biochemistry |
| Cholesterol | Internal | 50 | Biochemistry |
| Cholinesterase | External | 118 | Biochemistry |
| Chromium | External | 119 | Biochemistry |
| Chromogranin A | External | 119 | Biochemistry |
| Chromosomal Analysis | External | 119 | Genetics |
| Chromosome studies | External | 119 | Molecular Diagnosis |
| Citrate (Urinary) | External | 119 | Biochemistry |
| CK (Creatine Kinase) | Internal | 50 | Biochemistry |
| CKMB (Creatine Kinase MB isoenzyme) | Internal | 52 | Biochemistry |
| CLL (FISH) | External | 119 | Molecular Diagnostics |
| CMV (cytomegalovirus) PCR | External | 119 | Microbiology |
| CMV antibodies (cytomegalovirus) | External | 119 | Microbiology |
| Coagulation Screen (PT and APTT) | Internal | 138 | Haematology |
| Coagulation Factors | Internal | 103 | Blood Transfusion |
| Cobalt level | External | 119 | Biochemistry |
| Coeliac antibodies (tTG/tissue glutaminase abs/Alpha gliadin) | External | 119 | Immunology |
| Cold agglutinins | External | 119 | Blood Transfusion |
| Collagen Screen | External | 119 | Immunology |
| Copper level | External | 119 | Biochemistry |

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| Cordarone (amiodarone) | External | 119 | Biochemistry |
| Cortisol | External | 119 | Biochemistry |
| Cortisol 24hr urinary | External | 119 | Biochemistry |
| COVID-19 PCR | Internal | 174 | Microbiology |
| Coxiella burnetii antibodies | External | 119 | Microbiology |
| Coxsackie virus culture | External | 120 | Microbiology |
| CPE Screening(carbapenemase resistant Enterobaacteriaceae) | Internal | 176 | Microbiology |
| C-Reactive Protein (CRP) | Internal | 54 | Biochemistry |
| Creatine Kinase (CK) | Internal | 52 | Biochemistry |
| Creatine Kinase MB isoenzyme (CKMB) | Internal | 52 | Biochemistry |
| Creatinine | Internal | 53 | Biochemistry |
| Creatinine - enzymatic | Internal | 53 | Biochemistry |
| Crossmatch of blood units | Internal | 78 | Blood Transfusion |
| Crithidia | External | 120 | Immunology |
| CRP (C-Reactive Protein) | Internal | 52 | Biochemistry |
| Cryptococcus neoformans | External | 120 | Microbiology |
| CSF | Internal | 174 | Microbiology |
| CSF for Oligoclonal Bands | External | 120 | Immunology |
| CSF glucose | Internal | 69 | Biochemistry |
| CSF Protein | Internal | 70 | Biochemistry |
| CSF for viral studies | External | 120 | Microbiology |
| CTx (Beta Crosslaps) | Internal | 45 | Biochemistry |
| Cyclic citrullinated peptide (CCP) antibodies | External | 120 | Immunology |
| Cyclosporin | External | 120 | Biochemistry |

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| Cystic fibrosis screen-108 common mutations | External | 120 | Molecular Diagnostics |
| Cytogenetics on tissue/bone marrow | External | 120 | Molecular Diagnostics |
| Cytogenetics FISH (EDTA) | External | 120 | Molecular Diagnostics |
| Cytology Fluids – including Wangs, Sputa and Brushings | External | 120 | Histology |
| Cytomegalovirus antibodies (CMV) | External | 120 | Microbiology |
| Cytomegalovirus antibodies (CMV) PCR | External | 120 | Microbiology |
| Cytotoxic antibodies | External | 120 | Immunology |
| DAT(Direct Antiglobulin Test) | Internal | 77 | Blood Transfusion |
| D-Dimers | Internal | 146 | Haematology |
| Dengue virus antibodies | External | 120 | Microbiology |
| DHEAS (dehydroepiandrosterone sulfate) | External | 120 | Biochemistry |
| Differential White Cell | Internal | 145 | Haematology |
| Digoxin levels | External | 120 | Biochemistry |
| Direct Antiglobulin Test (DAT) | Internal | 77 | Blood Transfusion |
| Direct Coombs Test (DCT) | Internal | 77 | Blood Transfusion |
| DNA double strand (dsDNA) antibodies | External | 120 | Molecular Diagnosis |
| Dog allergy | External | 121 | Immunology |
| E. Coli typing | External | 121 | Microbiology |
| Ear Swabs | Internal | 176 | Microbiology |

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| EBV (Epstein Barr Virus) | External | 121 | Microbiology |
| EBV (Epstein Barr Virus) PCR | External | 121 | Microbiology |
| eGFR | Internal | 53 | Biochemistry |
| Electrolytes (Sodium, Potassium, Chloride) | Internal | 54 | Biochemistry |
| EMA (Eosin 5 Meleamide for flow cytometry) | External | 121 | Haematology |
| ENA ELISA (extractable nuclear antigens) | External | 121 | Immunology |
| Endomysial antibodies | External | 121 | Immunology |
| Eosin 5 Meleamide (EMA for flow cytometry) | External | 121 | Haematology |
| Epanutin (phenytoin) | External | 121 | Biochemistry |
| EPO (Erythropoietin) receptor antibodies | External | 121 | Immunology |
| EPO (Erythropoietin) levels | External | 121 | Biochemistry |
| Epstein Barr Virus (EBV) | External | 121 | Microbiology |
| Erythrocyte pyruvate kinase | External | 121 | Biochemistry |
| Erythrocyte Sedimentation Rate (ESR) | Internal | 145 | Haematology |
| ESR (Erythrocyte Sedimentation Rate) | Internal | 145 | Haematology |
| Ethanol (Alcohol) | Internal | 54 | Biochemistry |
| Ethanol (Ethyl Alcohol) | Internal | 54 | Biochemistry |
| Ethyl Alcohol (Ethanol) | Internal | 54 | Biochemistry |
| Extrinsic factor antibodies | External | 113 | Haematology |
| Extrinsic Factor assay screen: must state | External | 113 | Haematology |

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| required factors (see individual factors) | | | |
| Eye Swabs | Internal | 176 | Microbiology |
| Extended RBC Genotyping | External | 121 | Blood Transfusion |
| Factor IX | External | 121 | Haematology |
| Factor V (Leiden) | External | 121 | Haematology |
| Factor VII assay | External | 121 | Haematology |
| Factor VIII assay | External | 121 | Haematology |
| Factor VIII:C | External | 122 | Haematology |
| Factor X | External | 122 | Haematology |
| Factor Xa (Anti-Xa (DEB/diepoxybutane testing) | External | 122 | Haematology |
| Factor XI assay | External | 122 | Haematology |
| Factor XII assay | External | 122 | Haematology |
| Factor XIII | External | 122 | Haematology |
| Faeces | Internal | 177 | Microbiology |
| Fanconi anaemia | External | 122 | Molecular Diagnosis |
| Farmers lung antibodies (Microspora faenii) | External | 122 | Microbiology |
| FBC (Full Blood Count) | Internal | 145 | Haematology |
| Ferritin | External | 122 | Biochemistry |
| Fibrinogen | Internal | 138 | Haematology |
| Fibrinogen Concentrate(Riastap) | Internal | 102 | Blood Transfusion |
| Fine Needle Aspiration (FNA)Cytology | Internal | 149 | Histology |
| Fipili PDGFRA studies | External | 122 | Molecular Diagnosis |

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| FISH (CLL) | External | 122 | Molecular Diagnosis |
| FISH (Multiple myeloma) | External | 122 | Molecular Diagnosis |
| Fish allergy | External | 122 | Immunology |
| Flecainide (Tambacor) | External | 122 | Biochemistry |
| Flow cytometry - Bone marrow & blood | External | 122 | Haematology |
| Fluids | Internal | 178 | Microbiology |
| Fluids for Cytology – including Wangs, Sputa and Brushings | Internal | 149 | Histology |
| FNA (Fine Needle Aspiration) Cytology | Internal | 149 | Histology |
| Folate & Vitamin B12 | External | 123 | Biochemistry |
| Folicle stimulating hormone (FSH) | External | 123 | Biochemistry |
| Fragile X screen | External | 123 | Molecular Genetics |
| Free light chain assay | External | 123 | Immunology |
| Free T3 | External | 123 | Biochemistry |
| Free T4 (See TFT's) | External | 123 | Biochemistry |
| Frozen Sections | Internal | 146 | Histology |
| Fructosamine | External | 123 | Biochemistry |
| FSH (folicle stimulating hormone) | External | 123 | Biochemistry |
| Full Blood Count (FBC) | Internal | 145 | Haematology |
| Full virology screen | Internal | 181 | Microbiology |
| Fungal Culture and Microscopy | Internal | 178 | Microbiology |

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| G6PD (Glucose 6 phosphate dehydrogenase) | External | 123 | Biochemistry |
| GAD (Glutamic Acid Decarboxylase) autoantibodies | External | 123 | Immunology |
| Galactomannan | External | 123 | Biochemistry |
| Gamma glutamyl transferase (Gamma-GT) | Internal | 54 | Biochemistry |
| Gamma-GT (Gamma glutamyl transferase) | Internal | 54 | Biochemistry |
| Ganglioside antibodies | External | 123 | Immunology |
| Gastrin | External | 123 | Biochemistry |
| Genetic Cationic Trypsinogen SPINK-1 mutation | External | 123 | Molecular Diagnostics |
| Genital Tract and Associated Specimens | Internal | 170 | Microbiology |
| Gentamicin | Internal | 55 | Biochemistry |
| Globulin level | External | 123 | Immunology |
| Glomular basement membrane | External | 123 | Immunology |
| Glucagon | External | 123 | Biochemistry |
| Glucose | Internal | 55 | Biochemistry |
| Glucose (CSF) | Internal | 69 | Biochemistry |
| Glucose 6 phosphate dehydrogenase (G6DP) | External | 123 | Haematology |
| Glutamic acid decarboxylase (GAD) autoantibodies | External | 123 | Immunology |
| Glycoprotein I (B2) | External | 124 | Biochemistry |

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| Grass pollen allergy | External | 124 | Immunology |
| Group and Hold (Blood Group and Antibody Screen) | External | 124 | Blood Transfusion |
| Growth hormone (somatrophin) | External | 124 | Biochemistry |
| GTT (Glucose tolerance test) | Internal | 55 | Biochemistry |
| Gynaecological Cytology | Internal | 158 | Histology |
| Haemochromatosis mutations | External | 124 | Molecular Diagnostics |
| Haemoglobinopathy screen | External | 124 | Haematology |
| Haemophilia screen | External | 124 | Haematology |
| Haemophilus influenzae PCR | External | 124 | Microbiology |
| Haemosiderin | External | 124 | Biochemistry |
| Haptoglobin | External | 124 | Haematology |
| Hb A2 (see Thalassaemia) | External | 124 | Haematology |
| Hb electrophoresis (Thalassaemia) | External | 124 | Haematology |
| HbA1c | Internal | 56 | Biochemistry |
| HCG (Human chorionic gonadotrophin) | Internal | 56 | Biochemistry |
| HCG (Human chorionic gonadotrophin) | Internal | 58 | Biochemistry |
| HDL (HDL-Cholesterol) | Internal | 58 | Biochemistry |
| HDL-Cholesterol (HDL) | Internal | 58 | Biochemistry |
| Hepatitis A antibodies | External | 124 | Microbiology |
| Hepatitis and HIV viral screen | Internal | 181 | Microbiology |

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| Hepatitis B antibodies | Internal | 181 | Microbiology |
| Hepatitis B Core antibodies | Internal | 181 | Microbiology |
| Hepatitis B HBsAg (antigen) | Internal | 181 | Microbiology |
| Hepatitis B PCR (DNA viral load) | External | 124 | Microbiology |
| Hepatitis B total Core antibodies | Internal | 125 | Microbiology |
| Hepatitis C antibodies | Internal | 181 | Microbiology |
| Hepatitis C antigen | External | 125 | Microbiology |
| Hepatitis C PCR (RNA viral load) | External | 125 | Microbiology |
| Hepatitis E antibodies | External | 125 | Microbiology |
| Hepatitis screen (HBsAg & Hep C) | Internal | 181 | Microbiology |
| Her2Neu | External | 125 | Microbiology |
| Herpes simplex virus | External | 125 | Microbiology |
| HIAA - 5 (5-hydroxyindoleacetic acid) | External | 125 | Biochemistry |
| High affinity Hb | External | 125 | Haematology |
| Histology (Routine) | Internal | 154 | Histology |
| Histoplasmosis | External | 125 | Microbiology |
| HIV antibodies | Internal | 181 | Microbiology |
| HIV viral load (PCR) | External | 125 | Microbiology |
| HLA typing (oncology) | External | 125 | Blood Transfusion |
| HLA B27 (Tissue typing) | External | 125 | Blood Transfusion |
| HLA Class I typing for HLA matched platelets | External | 125 | Immunology |

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| HLA tissue typing for potential transplant patients/family | External | 125 | Immunology |
| Homocysteine | External | 125 | Biochemistry |
| House dust mite allergy | External | 125 | Immunology |
| HPA-Human platelet antigen typing | External | 126 | Immunology |
| Human chorionic gonadotrophin (HCG) | External | 126 | Biochemistry |
| HPA (Human platelet antigen typing) | External | 126 | Blood Transfusion |
| Hydroxyindoleacetic acid - 5 (5-HIAA) | External | 126 | Biochemistry |
| Hydroxy-Progesterone - 17 (progesterone) | External | 126 | Biochemistry |
| Hydroxyproline | External | 126 | Biochemistry |
| I.M. (Infectious Mononucleosis Screen) | External | 126 | Haematology |
| IgE | External | 126 | Immunology |
| IGF-1 (insulin like growth factor 1) | External | 126 | Biochemistry |
| IgG 4 (IgG Sub-classes) | External | 126 | Immunology |
| IgG Subclasses Profile | External | 126 | Immunology |
| Immunoglobulin A (IgA) | External | 126 | Immunology |
| Immunoglobulin E (IgE) | External | 126 | Immunology |
| Immunoglobulin G (IgG) | External | 126 | Immunology |
| Immunoglobulin gene rearrangement studies (PCR) | External | 126 | Molecular Diagnostics |
| Immunoglobulin M (IgM) | External | 126 | Immunology |

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| Immunohistochemistry | External | 126 | Histology |
| Immunophenotyping (peripheral blood) | External | 126 | Haematology |
| Infectious Mononucleosis Screen (I.M.) | Internal | 145 | Haematology |
| Influenza A & B and RSV detection | Internal | 181 | Microbiology |
| Influenza A & B antibodies | External | 127 | Microbiology |
| INR (Prothrombin time/PT) | Internal | 138 | Haematology |
| Insulin level | External | 127 | Biochemistry |
| Intrinsic factor antibodies | External | 127 | Haematology |
| Intrinsic pathway screen | External | 127 | Haematology |
| Iron Latent Cap (see iron studies) | External | 127 | Biochemistry |
| Iron levels (see iron studies) | External | 127 | Biochemistry |
| Iron Overdose 01 8092673 | External | 127 | Biochemistry |
| Iron studies (TIBC, UIBC, iron saturation & transferrin) | External | 127 | Biochemistry |
| Islet antibodies | External | 127 | Immunology |
| JAK2 - Exon 12 mutation analysis | External | 127 | Molecular diagnostics |
| JAK2 V617F mutation analysis: PCR test | External | 127 | Molecular diagnostics |
| JCV (JC virus) | External | 127 | Microbiology |
| Karyotyping | External | 127 | Molecular Diagnostics |
| Keppra (levetiracetam) | External | 127 | Biochemistry |

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| KRAS protein (V-Ki-ras2 Kirsten rat sarcoma viral oncogene homolog) | External | 127 | Haematology |
| La (& Ro) antibodies | External | 127 | Immunology |
| Lactate | Internal | 57 | Biochemistry |
| Lactate dehydrogenase (LDH) | Internal | 58 | Biochemistry |
| Lamotrigine (lamictal) | External | 127 | Biochemistry |
| Largactil (Chlorpromazine) | External | 127 | Biochemistry |
| LDH (Lactate dehydrogenase) | Internal | 58 | Biochemistry |
| LDL (LDL-Cholesterol) | Internal | 58 | Biochemistry |
| LDL-Cholesterol (LDL) | Internal | 58 | Biochemistry |
| Lead levels | External | 127 | Biochemistry |
| Leptospira antibodies | External | 127 | Microbiology |
| Leucocyte /HLA antibodies | External | 128 | Blood Transfusion |
| Leutenising Hormone (LH) | External | 128 | Biochemistry |
| Levetiracetam (keppra) | External | 128 | Biochemistry |
| LH (lutenising hormone) | External | 128 | Biochemistry |
| Lipase | External | 128 | Biochemistry |
| Lipid profile – fasting | Internal | 58 | Biochemistry |
| Lipid profile - random | Internal | 58 | Biochemistry |
| Lipoprotein A | External | 128 | Biochemistry |
| Lithium level | External | 128 | Biochemistry |
| Liver function tests (LFTs) | Internal | 59 | Biochemistry |
| Liver-Kidney microsomal antibody | External | 128 | Immunology |
| Lupus anticoagulant | External | 128 | Haematology |
| Lyme disease (Borrelia burgdorferi) | External | 128 | Microbiology |

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| Lymph Nodes | Internal | 155 | Histology |
| Lymphocyte immunophenotyping | External | 128 | Haematology |
| Lymphocyte subsets | External | 128 | Haematology |
| Magnesium | Internal | 59 | Biochemistry |
| Malaria Screen/Blood Smear for parasites | Internal | 145 | Haematology |
| Malaria verification | External | 128 | Haematology |
| Manganese level | External | 128 | Biochemistry |
| Measles antibodies | External | 128 | Microbiology |
| Meningitis screen on child (Haemophilus influenza PCR, Neisseria meningitidis PCR & Streptococcus pneumonia PCR) | External | 128 | Microbiology |
| Meningococcal PCR (Neisseria meningitidis PCR) | External | 128 | Microbiology |
| Mercury | External | 128 | Biochemistry |
| Metabolic screen | External | 129 | Biochemistry |
| Metanephrines 24 hr. urine | External | 129 | Biochemistry |
| Methotrexate | External | 129 | Biochemistry |
| Micro Array | External | 129 | Genetics |
| Microspora faenii (farmers' lung) | External | 129 | Microbiology |
| Milk allergy | External | 129 | Immunology |
| Mitochondrial antibodies. | External | 129 | Immunology |
| Mixing Studies | Internal | 146 | Haematology |

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| Molecular Investigation for other Blood Groups | External | 129 | Blood Transfusion |
| Mouth Swabs | Internal | 183 | Microbiology |
| MPO abs (Myeloperoxidase antibodies) | External | 129 | Immunology |
| MRD studies (minimum residual disease) | External | 129 | Haematology |
| MRSA Screening | Internal | 181 | Microbiology |
| MRSA Typing | External | 129 | Microbiology |
| Multiple myeloma (FISH) | External | 129 | Molecular Diagnostics |
| Mumps antibodies | External | 129 | Microbiology |
| Muscle Pathology | External | 129 | Histology |
| Muscular Dystrophy-1 (Muscular genetics/DNA analysis) | External | 129 | Molecular Diagnostics |
| Mycoplasma pneumoniae antibodies | External | 130 | Microbiology |
| MYD88 | External | 130 | Haematology |
| Myeloid Gene Panel | External | 130 | Haematology |
| Myeloperoxidase antibodies (MPO abs.) | External | 130 | Immunology |
| Myoglobin | External | 130 | Biochemistry |
| Myositis | External | 130 | Immunology |
| Nail cuttings for fungal culture | Internal | 178 | Microbiology |
| nDNA antibodies (DNA) | External | 130 | Immunology |
| Neisseria meningitidis PCR (meningococcal PCR) | External | 130 | Microbiology |
| Neuro Pathology | External | 130 | Histology |

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| NEURONAL ANTIBODY (HU, RI, YO, CV2, MA2) | External | 130 | Immunology |
| Neurontin (Gabapentin) | External | 130 | Biochemistry |
| Neutrophil cytoplasmic antibodies | External | 130 | Immunology |
| Neutrophil elastase mutation | External | 130 | Molecular Diagnosis |
| Norovirus (SRSV) | External | 130 | Microbiology |
| Novoseven (Recombinant Coagulation Factor VII) | External | 130 | Blood Transfusion |
| Octaplex (Human Prothrombin Complex) | External | 130 | Blood Transfusion |
| Oestradiol | External | 130 | Biochemistry |
| Olanzapine | External | 130 | Biochemistry |
| Oligoclonal bands | External | 130 | Immunology |
| Organic acids | External | 131 | Biochemistry |
| Osmolality | External | 122 | Biochemistry |
| Oxalate (urinary) | External | 131 | Biochemistry |
| P1NP (Procollagen Type-1 N-terminal Propeptide) | Internal | 61 | Biochemistry |
| Pancreatic polypeptide | External | 131 | Biochemistry |
| Pancreatitis (acute): Carbonic Anhydrase 1 & 2 (Anti Carbonic Anhydrase antibodies & Anti Lactoferrin antibodies) Genetic cationic trypsinogen SPINK-1 | External | 131 | Biochemistry |

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| mutation | | | |
| CFTR mutation (sent to cytogenetics in Crumlin as part of acute pancreatitis screen) | | | |
| Parainfluenza virus 1,2,3 antibodies | External | 131 | Microbiology |
| Paracetamol (Acetaminophen) | Internal | 42 | Biochemistry |
| Paraquat | External | 131 | Biochemistry |
| Parietal cell antibodies | External | 131 | Immunology |
| Parvovirus antibodies | External | 131 | Microbiology |
| PB (peripheral blood) immunophenotyping | External | 131 | Haematology |
| Penicillin G Allergy | External | 132 | Immunology |
| Penicillin V Allergy | External | 132 | Immunology |
| Pertussis antibodies (Bordetella pertussis) | External | 132 | Microbiology |
| Phenobarbitone | External | 132 | Biochemistry |
| Phenytoin (Epanutin) | External | 132 | Biochemistry |
| Phospholipid antibodies (B2-glycoprotein and cardiolipin antibodies) | External | 132 | Immunology |
| Phosphorous | Internal | 60 | Biochemistry |
| Plasma (LG OCTAPLAS) | Internal | 101 | Blood Transfusion |
| Plasma Viscosity | External | 132 | Biochemistry |
| Platelets | Internal | 101 | Blood Transfusion |
| Platelet antibodies | External | 132 | Blood Transfusion |
| Platelet refractoriness | External | 132 | Haematology |
| Platelet transfusion | External | 132 | Blood Transfusion |

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| PML RARA (AML/APL transcripts) | External | 132 | Molecular Diagnostics |
| Pneumococcal antibody titre | External | 132 | Microbiology |
| PNH (paroxysmal nocturnal haemoglobinuria) | External | 132 | Biochemistry |
| Polyoma (BK virus) | External | 132 | Microbiology |
| Porphyrins | External | 132 | Biochemistry |
| Post transfusion purpura-PTP | External | 132 | Immunology |
| Potassium | Internal | 60 | Biochemistry |
| Preadar Willi | External | 132 | Molecular Genetics |
| Pregnancy Tests | Internal | 183 | Microbiology |
| Pro collagen III antibodies | External | 132 | Immunology |
| Procollagen Type-1 N-terminal Propeptide* (P1NP) | Internal | 61 | Biochemistry |
| Pro insulin level | External | 133 | Biochemistry |
| Progesterone (Hydroxy-Progesterone – 17) | External | 133 | Biochemistry |
| Prograf (tacrolimus) | External | 133 | Biochemistry |
| Prolactin | External | 133 | Biochemistry |
| Protein | Internal | 62 | Biochemistry |
| Protein (CSF) | Internal | 70 | Biochemistry |
| Protein C & Protein S | External | 133 | Molecular Genetics |
| Protein electrophoresis (total protein, albumen, | External | 133 | Immunology |

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| immunoglobulins, B-2 microglobulin) | | | |
| Proteinase 3 ANCA | External | 133 | Immunology |
| Prothrombin mutation | External | 133 | Molecular Genetics |
| Prothrombin time (PT)/INR | Internal | 138 | Haematology |
| PSA | Internal | 62 | Biochemistry |
| PT (INR / Prothrombin time) | Internal | 146 | Haematology |
| PTH | Internal | 62 | Biochemistry |
| Pyruvate dehydrogenase | External | 133 | Biochemistry |
| Pyruvate kinase | External | 133 | Biochemistry |
| Q Fever (Coxiella burnetti) antibodies | External | 133 | Microbiology |
| Quantiferon (TB) | External | 133 | Microbiology |
| Recombinant Coagulation Factor VII (<i>e.g.</i> Novoseven) | External | 133 | Blood Transfusion |
| Recombinant Coagulation Factor VIII (<i>e.g.</i> Advate) | External | 133 | Blood Transfusion |
| Red Cell Concentrate (RCC) | Internal | 98 | Blood Transfusion |
| Red cell folate | External | 133 | Biochemistry |
| Reducing substances | External | 133 | Biochemistry |
| Renal pathology | Internal | 133 | Histology |
| Renin (& aldosterone if required) recumbent and standing | External | 134 | Biochemistry |

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| Renin (active) - random sample | External | 134 | Biochemistry |
| Reticulocyte Count | Internal | 137 | Haematology |
| RF (Rheumatoid Factor) | Internal | 63 | Biochemistry |
| Rheumatoid Factor (RF) | Internal | 63 | Biochemistry |
| Risperidone level | External | 134 | Biochemistry |
| Ristocetin co-factor (RiCOF) | External | 134 | Haematology |
| Ro (& La) antibodies | External | 134 | Immunology |
| Routine Histology | Internal | 154 | Histology |
| Rubella antibodies (antenatal) | External | 134 | Microbiology |
| Rubella antibodies (non antenatal) | External | 134 | Microbiology |
| Salicylate | Internal | 63 | Biochemistry |
| Salmonella/Shigella typing | Internal | 177 | Microbiology |
| SARS (Severe acute respiratory syndrome causing virus) | External | 134 | Microbiology |
| Selenium level | External | 134 | Biochemistry |
| Serum eGFR (see also Urinary Creatinine Clearance) | External | 134 | Biochemistry |
| Sex hormone binding globulin | External | 134 | Biochemistry |
| Sickle cell (see Thalassaemia) | Internal | 145 | Haematology |
| Sinus Aspirate | Internal | 183 | Microbiology |
| Sirolimus | External | 134 | Biochemistry |
| Skin Biopsies | Internal | 161 | Histology |

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| Skin IF | External | 134 | Immunology |
| Skin scrapings for fungal culture | Internal | 178 | Microbiology |
| Smooth muscle antibodies | External | 134 | Immunology |
| Sodium | Internal | 64 | Biochemistry |
| Sodium valporate | External | 135 | Biochemistry |
| Somatomedin-C (IgF-1) | External | 135 | Biochemistry |
| Somatrophin (growth hormone) | External | 135 | Biochemistry |
| Sputum | Internal | 184 | Microbiology |
| SRSV (small round structured virus or Norovirus) | External | 135 | Microbiology |
| STFR - (soluble transferring receptor) | External | 135 | Haematology |
| Synacthen test | External | 135 | Biochemistry |
| Syphilis -VDRL - antenatal | External | 135 | Microbiology |
| Syphilis -VDRL - non-antenatal | External | 135 | Microbiology |
| T3 or T4 (Free) | External | 135 | Biochemistry |
| Tacrolimus (Prograf) | External | 135 | Biochemistry |
| Tambacor (Flecainide) | External | 135 | Biochemistry |
| TB culture | External | 135 | Microbiology |
| TB QUANTIFERON | External | 135 | Microbiology |
| TBII (thyroid binding inhibitor immunoglobulin) | External | 135 | Immunology |
| T-cell receptor (TCR) gene rearrangement studies: PCR test | External | 135 | Molecular Diagnostics |
| T-cell subsets (CD4/8) | External | 135 | Haematology |

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| Tegretol | External | 135 | Biochemistry |
| Testosterone - free index | External | 135 | Biochemistry |
| Testosterone level- male/female/child | External | 136 | Biochemistry |
| Tetanus antibodies | External | 136 | Microbiology |
| TFTs (thyroid function tests - TSH & Free T4) | External | 136 | Biochemistry |
| Thalassaemia (Hb electrophoresis for HbA2 or HbF) | External | 136 | Haematology |
| Thalassaemia (α or β genotype) | External | 136 | Haematology |
| Theophylline | External | 136 | Biochemistry |
| Thiamine (see vitamin B1) | External | 136 | Biochemistry |
| Thiopurine methyl transferase (Haem TPMT) | External | 136 | Biochemistry |
| Throat Swab for C/S | Internal | 184 | Microbiology |
| Thrombin antibody | External | 136 | Haematology |
| Thrombophilia screen (Protein C & S, cardiolipin antibodies, prothrombin, lupus anticoagulant, homocysteine, antithrombin activity, factor V Leiden, factor VIII, fibrinogen) | External | 136 | Haematology |
| Thyroglobulin levels | External | 136 | Biochemistry |
| Thyroid binding inhibitor immunoglobulin (TBII) | External | 136 | Immunology |
| Thyroid peroxidase antibodies (TPO) | External | 136 | Immunology |

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| Thyroid receptor antibodies | External | 136 | Immunology |
| Thyroid stimulating hormone (TSH) | External | 136 | Biochemistry |
| TIBC (see iron studies) | External | 137 | Biochemistry |
| Tissue/Biopsy for C/S | Internal | 184 | Microbiology |
| Tn-T (Troponin-T) | Internal | 64 | Biochemistry |
| Tobramycin level (pre) | External | 137 | Biochemistry |
| Topiramate (topamax) | External | 137 | Biochemistry |
| Torch screen (Toxoplasma, CMV, Rubella, Herpes simplex) | External | 137 | Microbiology |
| Total Iron Binding Cap (see iron studies) | External | 137 | Biochemistry |
| Toxacara antibodies | External | 137 | Microbiology |
| Toxicology for drugs of abuse | External | 137 | Biochemistry |
| Toxicology – Urine (drugs of abuse) | External | 137 | Biochemistry |
| Toxoplasma antibodies | External | 137 | Microbiology |
| Tpha (antenatal) | External | 137 | Microbiology |
| Tpha (non-antenatal) | External | 137 | Microbiology |
| TPMT (Thiopurine methyl transferase) | External | 137 | Biochemistry |
| TPO (thyroid peroxidase antibodies) | External | 137 | Immunology |
| Transferrin receptor (STFR –soluble ransferring receptor) | External | 137 | Haematology |
| Transferrin saturation (see iron studies) | External | 137 | Biochemistry |

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| Transfusion Reaction Investigation | External | 137 | Blood Transfusion |
| Transfusion related acute lung injury (TRALI) | External | 137 | Blood Transfusion |
| Treponema pallidum (tpha) antenatal | External | 137 | Microbiology |
| Treponema pallidum (tpha) non antenatal | External | 137 | Microbiology |
| Triglycerides | Internal | 64 | Biochemistry |
| Trileptal levels | External | 137 | Biochemistry |
| Troponin-T (Tn-T) | Internal | 64 | Biochemistry |
| Tryptase | External | 137 | Biochemistry |
| TSH (thyroid function tests - TSH & Free T4) | External | 138 | Biochemistry |
| TSH receptor antibodies | External | 138 | Immunology |
| tTG antibodies (tissue transglutaminase antibodies/alpha gliadin antibodies) | External | 138 | Immunology |
| Tuberculosis | External | 138 | Microbiology |
| UIBC (see iron studies) | External | 138 | Biochemistry |
| Urea | Internal | 65 | Biochemistry |
| Uric acid | Internal | 65 | Biochemistry |
| Urinary ACR (Urinary Albumin:Creatinine Ratio) | Internal | 66 | Biochemistry |
| Urinary Albumin:Creatinine Ratio (Urinary ACR) | Internal | 66 | Biochemistry |
| Urinary Amylase | Internal | 66 | Biochemistry |
| Urinary Calcium | Internal | 66 | Biochemistry |
| Urinary Citrate | External | 138 | Biochemistry |

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| Urinary Cortisol | External | 138 | Biochemistry |
| Urinary Creatinine | Internal | 66 | Biochemistry |
| Urinary Creatinine Clearance (see also serum eGFR) | Internal | 67 | Biochemistry |
| Urinary Drugs of abuse | Internal | 67 | Biochemistry |
| Urinary Electrolytes | Internal | 67 | Biochemistry |
| Urinary Magnesium | Internal | 68 | Biochemistry |
| Urinary Microalbumin | Internal | 68 | Biochemistry |
| Urinary osmolality | External | 138 | Biochemistry |
| Urinary Phosphorous | Internal | 68 | Biochemistry |
| Urinary Protein | Internal | 69 | Biochemistry |
| Urinary Urea | Internal | 69 | Biochemistry |
| Urinary Uric Acid | Internal | 69 | Biochemistry |
| Urine 24h Electrophoresis | External | 138 | Immunology |
| Urine SPE (electrophoresis) | External | 138 | Immunology |
| Urine culture | Internal | 185 | Microbiology |
| Urine Legionella/Strep. pneumonia Antigen | Internal | 186 | Microbiology |
| Valproate | External | 138 | Biochemistry |
| Vancomycin | Internal | 65 | Biochemistry |
| Vanillylmandelic acid (VMA) | External | 138 | Biochemistry |
| Varicella antibodies | External | 138 | Microbiology |
| VDRL (antenatal) | External | 138 | Microbiology |
| VDRL (non-antenatal) | External | 138 | Microbiology |
| Venlafaxine | External | 138 | Biochemistry |

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| VIP (vasoactive intestinal polypeptide) | External | 138 | Biochemistry |
| Viral Screen must specify tests | External | 138 | Microbiology |
| Vitamin A | External | 138 | Biochemistry |
| Vitamin B1 (thiamine) | External | 138 | Biochemistry |
| Vitamin B6 | External | 138 | Biochemistry |
| Vitamin B12 & Folic Acid | External | 138 | Biochemistry |
| Vitamin C | External | 139 | Biochemistry |
| Vitamin D (25-OH) | External | 139 | Biochemistry |
| Vitamin E | External | 139 | Biochemistry |
| Vitamin K | External | 139 | Biochemistry |
| VRE Screening | Internal | 186 | Microbiology |
| VMA (vanillylmandelic acid) | External | 139 | Biochemistry |
| Von Williebrand factor (vWF:Ag) | External | 139 | Molecular Genetics |
| Weak D Genotyping | External | 139 | Blood Transfusion |
| White Cell Differential | Internal | 137 | Haematology |
| Wound swabs | Internal | 176 | Microbiology |
| Xanthochromia | External | 139 | Microbiology |
| Yersinia | External | 139 | Microbiology |
| YO antibodies (HU, RI, YO, CV2, MA2) | External | 139 | Immunology |
| Zinc | External | 139 | Biochemistry |