MIDLAND REGIONAL HOSPITAL PORTLAOISE

LABORATORY USER HANDBOOK

Pathology Department
Midland Regional Hospital @ Portlaoise
Dublin Rd
Portlaoise
Co. Laois

Tel: 057 8696270/8696271
Fax: 057 8696272

P/PATH/GDE/001
2025, 15th Edition
INAB Accredited Laboratory, Registration Number 203MT

Printed copies of the current edition are valid for use for 24 hours

Change History

A record of the change details from the previous revision of this document is listed in the table below.

Review Date	Section	Change Details
16 Dec 2024	All	Laboratory User Handbook updated in line with International Standard Medical Laboratories – Requirements for Quality and Competences (ISO 15189:2022)
		Format changed with colour and graphics introduced
		Reference ranges included
		Criteria for phoning critical results included
		Test requirements and specifications including limitations updated for onsite testing
		Test requirements for external tests included

Table of Contents

1.0 INTRODUCTION

This Laboratory User Handbook is designed to give an overall view of the services available in the Pathology Department, MRH Portlaoise. It is intended as a reference guide for all patients and users of the service.

The Pathology Department is also referred to as 'the Laboratory' in this document corresponding to the term 'Medical Laboratory' used in the International Standard ISO 15189:2022 titled 'Medical Laboratories – Requirements for Quality and Competence'

1.1 The Pathology Department is committed to providing a comprehensive service of the highest quality

The Pathology Department is committed to providing a comprehensive service of the highest quality.
It is comprised of the following key disciplines

- Biochemistry
- Blood Transfusion including Haemovigilance
- Haematology
- Microbiology
- Point of Care

All departments endeavour to perform their activities in accordance with the requirements of the International Standard 1SO 15189:2022 as detailed in scope registration number 203MT. All Pathology services undergo continuous review through quality assurance and audit activities.
The Irish National Accreditation Board (INAB) monitors the quality management system and compliance with the EU Blood Directive 2002/98/EC.

Tests performed within the Pathology Laboratory, MRH Portlaoise and currently accredited by INAB to ISO 15189 are available on:https://www.inab.ie/inab-directory/laboratory-accreditation/medical-testing-laboratories/

1.2 Quality Assurance

All laboratory departments aim to give the highest quality of service with the minimum of delay. To ensure this, all departments participate in recognised External Quality Assurance Schemes. There are also extensive internal quality control checks. Any problems regarding the quality of service should be brought to the attention of the Head of Department concerned.

Accreditation
Tests performed within the Pathology Laboratory, MRH Portlaoise and currently accredited by INAB to ISO 15189 are available on:https://www.inab.ie/inab-directory/laboratory-accreditation/medical-testing-laboratories/

For tests sent to referral laboratories accreditation status can be found on the link above.

1.3 External Third Party Assessment Programme

The Pathology Department **participates** in relevant available **external third party assessment schemes**.
This includes schemes operated by:-

- NEQAS (UK, National External Quality Assurance Scheme)
- IEQAS (Irish External Quality Assurance Scheme)
- RIQAS (Randox International Quality Assurance Scheme)
- BIO-RAD Laboratories EQAS (BIO-RAD Laboratories External Quality Assurance Services)
- Labquality External Quality Assurance Scheme

The Pathology Department is committed to participating in other schemes, as they become available and are required, to ensure comprehensive assessment of the test repertoire.

1.4 This manual is intended for users of the Pathology Services both within the hospital, and those from outside agencies.

This manual is intended for users of the Pathology Services both within the Midland Regional Hospital Portlaoise, and those from outside agencies.

The Laboratory can only process samples for Service Users who are registered with the HSE.

External Service Users are required to register with the Lab to use its services and obtain Laboratory results.

External Service Users of the Laboratory are required to provide an Out of Hours Number for the Communication of Critical Results (Mandatory).

Please contact the Laboratory Manager for details.

1.5 Laboratory management are committed to:-

Laboratory management are committed to providing a comprehensive service of the highest quality as detailed in the Quality Policy.

The Quality Policy of the Pathology Department, Midland Regional Hospital Portlaoise

The Pathology Department makes a major contribution to patient care, and in all its activities, the patient is the primary focus. The Pathology Department 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 patients and users of the service are met, the Pathology Department will:-

- Uphold professional values and is committed to good professional practice and conduct.
- Commit to impartiality and freedom from conflict of interest.
- Operate a quality management system to integrate the organisation policies, procedures, processes and resources.
- Establish and review quality objectives and plans in order to implement this quality policy.
- Ensure that all personnel are familiar with this quality policy to ensure patient and user satisfaction.
- Commit to the health, safety and welfare of all it's staff.
- Ensure opportunities for patients and laboratory users to provide helpful information to aid the laboratory are provided
- Provide patients and users with publically available information about the examination process
- Ensure examinations provided by the Laboratory are periodically reviewed
- Provide where appropriate, disclosure to patients, users and any other relevant persons, of incidents that resulted or could have resulted in harm
- Endeavour to treat all patients, samples, or remains with due care and respect
- Ensure visitors to the department will be treated with respect, and due consideration will be given to their safety while on site.
- Obtain informed consent when required.
- Ensure ongoing availability and integrity of retained patient samples and records in the event of the closure, acquisition or merger of the laboratory
- Make relevant information available to a patient and any other health service provider at the request of
- the patient or the request of a healthcare provider acting on their behalf.
- Uphold the rights of patients to care that is free to discrimination

The Pathology Department (including Haemovigilance and Traceability) will commit to comply with the standards/regulations set by:

- The Irish National Accreditation Board (INAB) Terms and Conditions.
- The International standard ISO 15189:2022 current version.
- EU Directive 2002/98/EC.
- Minimum Requirements for Blood Bank Compliance with Article 14 (Traceability) & Article 15 (Notification of Serious Adverse Reactions and Events) of EU Directive 2002/98/EC (AML-BB).
- General Data Protection Regulation (GDPR) 1988-2018

The objective of the quality management system is to provide the services as defined in the Quality Manual and test examinations as detailed in the Laboratory User Handbook. The Pathology Department 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 the equipment and other resources as 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 are fit for intended use and 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 improvement of the quality of Laboratory services.
- The safe testing, distribution and transfusion of blood, blood components and products.
- Compliance with the requirements of the international standard ISO15189 current version, and continual improvement of the quality of Laboratory services.
- The investigation and reporting of Serious Adverse Events and Serious Adverse Reactions to the National Haemovigilance Office
- Provision of Clinical Advisory Services
- Provision of Point of Care Services

2.0 GUIDE TO USING THIS MANUAL FOR PATIENTS AND USERS OF THE SERVICE

This Laboratory User Handbook contains details of, the analytical services available, advice of sample collection and transport and contact numbers for your information. Also included is a guide to appropriate use of Blood and Blood Products,

The Laboratory User Handbook is available in electronic format only.

Within the hospital for staff members of MRHP, the manual can be accessed in the following ways:-

.

1) On the Hospital Q Pulse system. Use search criteria key words 'Laboratory User Handbook'

2) On the 'MRHP Medicines App' MEGe Guides. A password is required. Contact the Laboratory for details.

3) On the Internet, Use search criteria key words 'Portlaoise Laboratory User Handbook'

4) On the Laboratory result look up system 'Ward Lookup' as an icon on the home screen

Outside the hospital.
For external users who have internet facilities the manual can be accessed using search criteria key words 'Portlaoise Laboratory User Handbook'

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, Comments or suggestions regarding this user manual should be addressed to:
Laboratory Quality Officer,
Pathology Department,
Midland Regional Hospital
Dublin Rd
Portlaoise
Co. Laois

Phone: 057 869 6278
email: jennifer.cooper@hse.ie

A table of laboratory tests/profiles carried out in each department is available.
Refer to the following:

Section 7.0 for Table of Biochemistry Tests

Section 8.0 for Table of Haematology Tests

Section 9.0 for Table of Blood Transfusion Tests

Section 10.0 for Table of Microbiology Tests

Section 11.0 for Histology and Cytology for details on Histology and Cytology specimen requirements

Section 14.0 Point of Care

Section 15.0 for Table of Tests Referred to External Laboratories

2.1 LABORATORY TESTS/PROFILES AVAILABLE

2.2 Laboratory Tests/Profiles available

Laboratory Request Forms, Specimen Bottles and Containers	Section 4.0
Packaging and Transport Requirements for Specimens	Section 5.0
Laboratory Test/Profile Tables	A table of laboratory tests/profiles carried out in each department is available. Refer to Section 7.0 for Biochemistry specimen requirements. Section 8.0 for Haematology specimen requirements. Section 9.0 for Blood transfusion specimen requirements. Section 10.0 for Microbiology specimen requirements. Section 11.0 for Histology and Cytology specimen requirements. Section 15.0 for Tests Referred to External Laboratories.
Laboratory Test/ Profile Description	Each laboratory test is described under specified headings**.**
Specimen sizes	The Laboratory Test Profile tables specify only the adult specimen volumes. Information on the specimen sizes available for both adult and paediatric specimen types. Paediatric samples for Biochemistry test requests should be taken into paediatric sample bottles. Refer to section 3.17 **Please ensure bottles are within their expiry date. Samples sent to the laboratory using expired sample bottles will be rejected.**
Tests for referral to external laboratories	Section 15.0 contains an alphabetical list of laboratory tests referred to external laboratories and any special requirements. **Note:** Tests may be Hospital only Tests may be Consultant only This is not an exhaustive list and if in doubt please discuss with a medical scientist before taking the specimen (ext 96280). Section 15.0 **PLEASE SEND REQUESTS FOR SPECIALISED TESTS DURING ROUTINE WORKING HOURS.**
Endocrinology /Immunology	A range of Endocrinology/Immunology Tests and Profiles are provided in MRH Mullingar Endocrinology/Immunology departments. Requests for tests that are not performed in the Pathology Lab Portlaoise: • MUST be sent with a separate sample • If requesting additional Immunology or other specialist tests, a separate request form MUST also be sent **NOTE: A separate sample is required for Endocrinology tests and another separate sample is required for Immunology tests.** **Refer to section 15.0 for alphabetical table of examinations and specimens required**. **Please Use Blue and White General Biochemistry/Haematology Forms.**
B12/Folate requirements	Demand management for Vitamin B12 and Folate requests was implemented by MRH Mullingar in June 2019 for GP users A completed "Vitamin B12/Folate Clinical Information form" is required with each patient's sample. This is mandatory requirement as of 24th of June 2019.

Tumour Markers	A range of Tumour Markers are provided in **Midland Regional Hospital Tullamore** Biochemistry department. **Refer to section 15.0 for alphabetical table of examinations and specimens required**. **Please Use Blue and White General Biochemistry/Haematology Forms.** **Another separate sample is required for each External test.**
Specialised tests	**PLEASE SEND REQUESTS FOR SPECIALISED TESTS DURING ROUTINE WORKING HOURS.** A wide range of specialised tests are referred to external Laboratories and may require specialised sampling and/or patient preparation. **Refer to section 15.0 for alphabetical table of examinations and specimens required**. Note this is not an exhaustive list and IF IN DOUBT please discuss with a Medical Scientist before taking the specimen. Refer to section 3.2, Pathology Department Telephone Numbers, for list of contact numbers Most specialised Biochemistry and Immunology requests are referred to: Eurofins Biomnis Laboratories Phone *51395 (01 295 8545) National Virus Reference Laboratory NVRL Phone *51224 (01 706 7777) St. James Hospital, Dublin Phone *51074 (01 453 4941) **Clinical Details must be provided.**
General Test Portfolio Guide for Pathology MRH Portlaoise	The General Test Portfolio Guide for Pathology MRH Portlaoise recommends the number of samples requires for common laboratory tests/profiles and any special requirements. Refer to section 3.21 Pathology MRH Portlaoise General Test Portfolio Guide.
Emergency Out of Hours Service	**Information on the Emergency Out of Hours Service is detailed in section 3.19 TESTS AVAILABLE OUT OF HOURS ARE LISTED IN SECTION 3.19**
Accreditation	Tests performed within the Pathology Laboratory, MRH Portlaoise and currently accredited by INAB to ISO 15189 are available on:https://www.inab.ie/inab-directory/laboratory-accreditation/medical-testing-laboratories/ For tests sent to referral laboratories accreditation status can be found on the link above.

3.0 GENERAL INFORMATION FOR PATIENTS AND USERS OF THE SERVICE

The Pathology Department Midland Regional Hospital, Portlaoise provides a comprehensive clinical diagnostic laboratory service including:

- Biochemistry
- Blood Transfusion including Haemovigilance
- Haematology
- Microbiology

The following is also provided

- Point of Care Testing co-ordinator
- Infection Control Services and advice
- Advisory Services
- Referral of tests to External Laboratories

The Laboratory serves the Acute Midland Regional Hospital at Portlaoise, District Hospitals, Nursing Homes, General Practitioners and Prison Service.

The Laboratory in Portlaoise is part the HSE Dublin and Midlands.

It is one of three Laboratories in the Midland Area. The other two laboratories are located in the Midland Regional Hospital, Tullamore and the Midland Regional Hospital, Mullingar. Through this network there is access to an extensive range of laboratory tests.

3.1 Pathology Department Opening Times

The Laboratory provides a routine service to the hospital and to general practitioners. An On-Call service is provided to the hospital only for processing of non-deferrable/urgent test requests. Please note that there is no routine service provided on Saturday/Sunday/Bank Holidays.

	Opening Times
Pathology Reception	Monday to Friday 08:30 – 17:00
Routine Laboratory Diagnostic Service	Monday to Friday 08:00 – 18:00
Limited laboratory Diagnostic Service	Monday to Friday 18:00 – 20:00
Emergency out of hours service (On-Call diagnostic service)	Monday to Friday, 20:00 – 08:00 Saturday/Sunday/Bank Holidays (24 Hours)

	Routine Service
Routine Specimens	To ensure routine processing on the day of receipt, specimens should arrive before 16:00 and before 15:30 for Blood Transfusion Requests.
Urgent Specimens	**Telephone urgent requests directly to the laboratory** to ensure priority processing and send the specimen immediately to the Laboratory Reception.
Urgent Requests	**Telephone urgent requests directly to the laboratory** to ensure priority processing and send the specimen immediately to the Laboratory Reception.
Contact Phone Numbers	**Out of hours ensure the relevant Medical Scientist 0n-Call is contacted for the handling of urgent specimens**. **Haematology/Blood Transfusion *51775 (087 6394811)** **Biochemistry/Microbiology *51769 (087 2511468)** **Microbiology 09:00-14:00 (Sat, Sun Inc BH) 96266 (057 8696266)** **Biochemistry 09:00-14:00 (Sat, Sun Inc BH) *51769 (087 2511468)**
Alternative Contact Number	Alternatively the Medical Scientist On-Call can be contacted through the switch board (dial 3000).
Request Forms	Emergency on call request forms are provided to the clinical areas for Biochemistry and Haematology test requests. • Biochemistry Green On-Call Form • Haematology Pink On-Call Forms • Microbiology routine form • Blood Transfusion routine form A **request form** must accompany each specimen and must be fully completed and legible.
Transport	**Ensure specimen(s) and form(s) are sent to the laboratory ASAP.** **Via the pneumatic tube system to:** **Destination number 001 for Biochemistry/Microbiology** **Destination number 012 for Haematology/Blood Transfusion** Refer to section 5.2.1 for Exceptions and Instructions for Use of the Pneumatic Tube system**.**
Alternative transport	**Arrange for a porter to take it to the laboratory reception**
Limited/ Emergency out of hours service	**A Limited/ Emergency out of hours service (On-Call diagnostic service) is provided for Non-deferrable/ urgent test requests** Refer to Section 3.19 for details of the emergency out of hours service.

3.2 Pathology Department Telephone Numbers

For **telephone queries please direct all calls to the laboratory office where possible.** Please limit the number of calls regarding patient results as the majority of results are available on the Laboratory result look up system 'Ward Lookup' for internal patients or healthlink for external patients.

Portlaoise Laboratory

SECTION	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Laboratory Office/ Result Enquiries	**96270/96271**	**057 8696270 057 8696271**
Specimen Reception	**96848**	**057 8696848**
Laboratory Reception	96843 96851	057 8696843 057 8696851
Blood Transfusion	96269	057 8696269
Haematology	96274	057 8696274
Biochemistry	96267	057 8696267
Microbiology	96266	057 8696266
Blood Cultures/Faeces/Molecular Tests	96273	057 8696273
External Tests	96280	057 8696280
Emergency On-Call Phone Haematology/Blood Transfusion	*51775	087 6394811
Emergency On-Call Phone Biochemistry/Microbiology	*51769	087 2511468
Point of Care	*51755	087 4869368
Phlebotomy Service	96614	057 8696614
Quality Office	96278	057 8696278
Laboratory Fax	96275	057 8696275

Key Personnel, their position and contact information

KEY PERSONNEL	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Consultant Haematologist(s) Dr Kanthi Perera Dr Gerard Crotty	*51920 (Switch MRH Tullamore) or 8348 (Haematology Dept MRH Tullamore)	057 9321501 (Switch MRH Tullamore) or 057 9358348 (Haematology Dept MRH Tullamore)
Consultant Chemical Pathologist Dr Vivion Crowley		087 4156911 (Use first) 01 4162935
Consultant Microbiologist Dr. Pankaj Lal	58349 *51205	00447914783231
Consultant Histopathologist Dr Margaret Lynch		087 2346389
Deputy Consultant Microbiologist Dr Emilia Mamwa		On request from Lab
Deputy Consultant Chemical Pathologist Dr Rama Srinivasan		On request from Lab
Laboratory Manager Shay Conroy	96844	057 8696844
Biochemistry **Chief Medical Scientist** Ms Sharon Ayres	96285	057 8696285
Haematology/Blood Transfusion Chief Medical Scientist Ms Frances Earley	96840	057 8696840
Microbiology **Chief Medical Scientist** Ms Aideen Joyce	96852	057 8696852
Lab Office/Result Enquiries	96270/96271	057 8696270/8696271
Infection Control Ms Anne-Marie Hogan Ms Celine Muthukumaran Ms Sharon O'Loughlin	*51917 (92711 Office MRHP)	086 3802615 087 1197496 087 7114282
Area Medical Officer Dr Kathleen Dunne	*51748 (086 8069866)	057 9359891 Email PublicHealth.AreaB@hse.ie
Antimicrobial Pharmacist Ms Andrea Burke	Bleep 143	Email: Andrea.Burke@hse.ie
Haemovigilance Officer Ms Eithne Lacey	96066 Bleep 072	057 8696066
Quality Officer Ms Jennifer Cooper	96278	057 8696278
IT Pierce Walsh ICT Business Co Ordinator	96099	086 1972596
Surveillance Scientist Mr Gordon Lalor	96847	057 8696847
Point of Care Ms Caitriona Ging	*51755	087 4869368

Mullingar Laboratory

SECTION	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Midland Regional Hospital at Mullingar	*51005	044 9340221
Biochemistry	044 9394328	044 9394328
Blood Transfusion	044 9394329	044 9394329
Endocrinology	044 9394334	044 9394334
Haematology	044 9394333	044 9394333
Immunology	044 9394339	044 9394339
Laboratory Office / Result Enquiries	**044 9394327**	**044 9394327**
Laboratory Reception	044 939 4330	044 9394330
Microbiology	044 9394332	044 9394332

Tullamore Laboratory

Section	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Midland Regional Hospital at Tullamore	*51920	057 9321501
Biochemistry	58504	057 9358504
Blood Transfusion	58385	057 9358385
Haematology	58351	057 9358351
Histology Laboratory	58338	057 9358338
Histology Secretaries	**58342**	**057 9358342**
Laboratory Office / Result Enquiries	**58342**	**057 9358342**
Microbiology	58507/58508	057 9358507

Other Useful Numbers:

Section	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Beaumont Hospital	*51041	01 8377755
Eurofins Biomnis Laboratory	*51395	01 2958545
Coombe Hospital	*51053	01 4085200
Cytology Lab, Rotunda	*51207	01 8720919
Irish Blood Transfusion Service (I.B.T.S)	*51240	01 4322800
CHI Crumlin	*51050	01 4558111
Peamount Hospital	*51068	01 6280685
St. James' Hospital	*51074	01 4534941
St. Vincent's Hospital	*51080	01 2694533
Temple St. Hospital	*51049	01 8748763
Virus Reference Lab, UCD, Belfield	*51224	01 7067777

3.3 Pathology Department Fax Number

057 8696272 (Laboratory Office)

057 8696275 (Laboratory)

3.4 Pathology Department Postal address

Pathology Department
Midland Regional Hospital Portlaoise
Dublin Road
Portlaoise
Co. Laois R32 RW61

3.5 Central Telephone Number

SECTION	IN HOUSE	FROM OUTSIDE OF HOSPITAL
Main switchboard number for Midland Regional Hospital at Portlaoise	3000	057 8621364
Laboratory Office/Result Enquiries	96270/96271	057 8696270 057 8696271

3.6 Staffing

The Pathology department team consists of:-

- Consultant Pathologist(s) (Five in Midland Area)
- Consultant Haematologist(s) (Two based in MRH Tullamore)
- Consultant Microbiologist (Locum based in UK)
- Consultant Chemical Pathologist (based in St James' Hospital, Dublin)
- Laboratory Manager
- Heads of Department – Chief Medical Scientist/
- Laboratory Staff – Senior Medical Scientists/Medical Scientists
- Medical Laboratory Aides
- Laboratory Quality Officer
- Point of Care Co-Ordinator
- Transfusion Surveillance Officer
- Surveillance Scientist (based in MRH Tullamore)
- Surveillance Scientist (based in MRH Portlaoise)
- Support Services
  - Information Technology
  - Secretarial
  - Specimen Reception
  - Housekeeping

3.7 Where to find us

The Pathology Department (Haematology, Blood Transfusion, Biochemistry and Microbiology) is located beside the outpatient (OPD) clinic in the Midland Regional Hospital, at Portlaoise.

3.8 Visitors

The Pathology Department operates so that the facilities and environmental conditions are suitable for the laboratory activities and its workload can be performed without adversely affecting the safety of patients, visitors, laboratory users and personnel.

The design and workflow of the Laboratory is such that there is a clear segregation between clerical and Laboratory areas. Patients and visitors are protected from recognised hazards.

The Pathology Department ensures visitors to the department will be treated with respect, and due consideration will be given to their safety while on site.

Safety
To ensure safety, all visitors must introduce themselves at the Pathology Department reception area, and wait there until they are met by the person they wish to see. It is best to make appointments in advance.

A poster regarding Visitor Information and Fire Safety is displayed at reception for laboratory staff and visitors.

There is a sign-in register for people visiting the Pathology Department.

Visitors are asked to sign a 'visitor sign-in book' on arrival and sign out on departure. The secretaries at Reception manage the Visitor book.

Confidentiality
A Privacy and Confidentiality Code is displayed at reception for laboratory staff and visitors.

Visitors to the Pathology Department are asked to sign the visitors' book at Reception. A Hospital Confidentiality statement outlies the requirement for compliance in relation to the maintenance of patient information confidentiality.
Visitors are asked to sign that they have agreed to be compliant.

3.9 Consent

For routine Laboratory procedures consent is inferred. Written consent is obtained if required.
Consent for Blood Transfusion is obtained where possible, by the Clinical Team in line with Hospital Guidelines.

Routine blood sampling
For a simple procedure such as venepuncture (blood sampling), consent by the patient is given to the person taking the blood (usually verbally and either explicit or implicit).
It is the responsibility of the doctor or trained nurse taking the blood to inform the patient of the procedure that is to be carried out and gain consent when required.
Such consent is not communicated to the Laboratory and consent for analysis is implicit in the submission of the specimen and request form.

Consent is obtained for laboratory analysis where required e.g consent to disclose clinical information and family history where required.
Currently consent forms are required for genetic testing. Consent forms are available from the laboratory.
Refer to section 15.0 for Table of Tests Referred to External Laboratories

Blood Transfusion
A verbal consent is required for transfusion of blood, blood components and products (except in emergency cases). Consent should be recorded by the attending doctor, by ticking the box on the front of the 'Blood Component/Product Transfusion and Prescription Record Sheet' (BTPRS).
Patient Consent and Patient Information Leaflets are available for Blood Transfusion.

Refer to section 4.1 for details regarding patient identification and specimen collection.

3.10 Confidentiality Data Protection

Management of Information

The Pathology Department ensures all patient information obtained or created during the performance of laboratory activities is treated as confidential.

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, privacy 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.

Data protection breaches will be handled in line with HSE data protection policy.

All personal data collected is retained in accordance with the HSE record Retention Policy.
All Laboratory staff complete HSE training to comply with Data Protection and General Data Protection Regulation (GDPR).

All Laboratory staff who receive patient personal information are bound by confidentiality and data protection laws.

Clinical research
The Pathology Department obtains written informed consent and the approval of the Hospital Ethics Committee for any clinical research/clinical trials. Patients are informed as required.

The Pathology Department does not publish information pertaining to patients in the public domain. As a HSE Laboratory information is released to health and social care bodies, regulatory bodies and reporting programs as required.

Release of Information

The Pathology Department in MRH Portlaoise is required by law (statutory requirement) to release the following information:

- Information pertaining to notifiable diseases is reported to the Health Protection Surveillance Centre (HPSC) by the Surveillance Scientist.
- A Hospital Blood Bank Annual Report is submitted to the Health Products Regulatory Authority (HPRA) relating to blood component administration.
- Incidents relating to severe adverse reaction and events relating to blood component administration are reported to the National Haemovigilance Office by the Transfusion Surveillance Officer.

Reporting of notifiable diseases to the Health Protection Surveillance Centre (HPSC).

The Health Protection Surveillance Centre (HPSC) defines a list of notifiable diseases in line with statutory requirements. It is the policy of the Pathology Department to adhere to the statutory requirements for the reporting of notifiable diseases.

The standardised procedure on the collection and submission of data reports to the Health Protection Surveillance Centre (HPSC) is via the Computerised Infectious Disease Reporting system (CIDR). Patients' name, date of birth, address, hospital identification number and test examination results are submitted where required for notifiable diseases.

- CIDR can provide timely and comprehensive information to facilitate public health action in individual cases of infectious disease.
- Public Health will contact individual patients where required.
- The Area Medical Officer co-ordinates the management of notifiable diseases.
- CIDR can provide standard reports (statistical) on the incidence and burden of infectious diseases nationally, regionally, and locally.

It is the policy of the Pathology Department to participate in the European Antimicrobial Resistance Surveillance Network (EARS – NET), which involves the preparation and submission of data reports to the Health Protection Surveillance Centre (HPSC) for the European Antimicrobial Surveillance System (EARS - NET). The aim of EARS – NET is to provide comparable and validated data on the prevalence and spread of major invasive bacteria with clinically and epidemiologically relevant antimicrobial resistance in Europe.

The Surveillance Scientist collates enhanced data for submission to the Health Protection Surveillance Centre (HPSC). Hospital Identification number, date of birth and test examination results are submitted, where required for:

- Clostridium difficile associated disease (CDAD)
- Carbapenemase-producing Enterobacterales (CPE)

It is the policy of the Pathology Department to report Hospital Acquired (HA) Infections to the Business Intelligence Unit (BIU). The Surveillance Scientist collates data pertaining to the following for submission on a monthly basis. Statistics are submitted where required for:

- Hospital Acquired C.difficile infections
- Hospital Acquired Staph aureus bloodstream infections
- Hospital Acquired Covid infections
- Carbapenemase-producing Enterobacterales (CPE) and meropenem usage

<u>Reports to Health Products Regulatory Authority (HPRA)</u>
The Health Products Regulatory Authority (HPRA) is the Competent Authority for medicinal products (including blood derived medicinal products). The Pathology Department is compliant with submitting a completed Hospital Blood Bank Annual Report to the HPRA.

The Hospital Blood Bank Report includes a declaration of compliance with the requirements of S.I No 3060 of 2005 and provide details of the systems that are in place to ensure compliance.
Statistics only are submitted.

<u>Reports to the National Haemovigilance Office</u>
The National Haemovigilance Office (NHO) was established in 1999 by the Department of Health to operate a National Haemovigilance system. 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. The Haemovigilance Service in the Midland Regional Hospital, Portlaoise is a Consultant led service, with a Transfusion Surveillance Officer (TSO) based on site.

It is the policy of the Pathology Department to adhere to the statutory requirements for the reporting of Severe Adverse Reactions (SARs) and Severe Adverse Events (SAEs) relating to blood component administration.

- Incidents of SARs and SAEs relating to blood component administration, are reported to the National Haemovigilance Office (NHO) by the Transfusion Surveillance Officer. Reports are anonymised and are submitted with a unique identification number, the patient's gender and their date of birth.
- The Consultant Haematologist co-ordinates the management of severe adverse reaction and events relating to blood component administration.

Personnel Responsibility

The Pathology Department ensures personnel, including any committee member, contractors, personnel of external bodies, or individuals with access to laboratory information acting on the laboratory's behalf, keep confidential all information obtained or created during the performance of laboratory activities.

Personnel
All Laboratory staff and Hospital staff in the Midlands Regional Hospital, who receive patient personal information are bound by confidentiality and data protection laws.

Committee members
All Laboratory staff and Hospital staff the in Midlands Regional Hospital who attend Pathology Department meetings are bound by confidentiality and data protection laws.

Contractors and personnel of external bodies
There is a Service Level Agreement (SLA) and/or Service Contract in place for all suppliers of external service. A Privacy and Confidentiality Code is displayed at the Laboratory reception for visitors, which outlines the requirement for compliance in relation to the maintenance of patient information confidentiality. All visitors are asked to sign the visitors' book at Reception that they have agreed to be compliant.

Where the service provider requires third party access to systems the Pathology Department ensures that a Service Provider Confidentiality Agreement for Automated equipment (analysers) with Data Management Systems is included as part of the Service Level Agreement) or HSE Service Provider Confidentiality Agreement is signed.

Individuals with access to laboratory information acting on the laboratory's behalf
The Pathology Department refers samples to external referral laboratories if required for further testing. This is only done where a clinician has requested a specific test not provided on site or if there is a genuine need in order to ensure the highest quality of care.

It is the policy of the Pathology Department to enter into a service level agreement/memo of understanding with third parties.
External referral laboratories are bound by confidentiality and the data protection laws.

3.11 Complaints/Compliments

Opportunities for patients and laboratory users to provide helpful information to aid the Pathology Department are provided through the use of:

- Customer Surveys
- Resolution of complaints
- Structured communication
- Direct communication

Customer Survey

The Pathology Department is committed to the use of surveys to monitor customer satisfaction. The Pathology Department seeks information relating to user perception as to whether the service has met the needs and requirements of users on behalf of patients. .

Complaints

The Pathology Department has a documented procedure for the management of complaints and compliments.

Users of the service may make a complaint/compliment about any aspect of the pathology service to any member of staff.

Complaints/compliments may be received verbally, by letter, fax or e-mail.

Alternatively the complainant may:

- email: yoursay@hse.ie
- Use website online comments and complaints facility ww.hse.ie *www.hse.ie/yoursay*
- Contact Your service your say team 1800 424555 or 01 6424555.
- Contact HSELive Team on 1800 700 700
- Use website *www.hse.ie/yoursay* for further information.

All complaints are acknowledged, investigated and responded to within a specified timeframe. Records of all complaints and compliments received are maintained.

Structured communication

The Pathology Department recognise the value of good communication systems with its stakeholders and have established structured meetings to improve communications and to facilitate its liaison & communications with other departments.

Direct Communication

The Pathology Department welcomes direct communication from patients and laboratory users including compliments or other feedback. All feedback is considered by the Laboratory Manger in conjunction with the Quality Management Team.

Where an opportunity for change is identified, the process is controlled by procedure P/QA/SOP/044 titled 'Procedure for the Control of Change to Equipment, Processes, Techniques and Controlled Documentation'

3.12 Open Disclosure

The Pathology Department is aligned with the Quality & Safety structure in the Hospital and follows the Hospital HSE process for Open Disclosure to patients, users and any other relevant persons, of incidents that resulted or could have resulted in patient harm.

All laboratory staff complete HSE training 'Communicating effectively through Open Disclosure'.

The procedure for reporting incidents/near miss is carried out in line with the Hospital HSE process for HSE Incident Management Framework and Guidance tiled 'HSE Incident Management Framework – Guidance'.

The Pathology Department is required by law (statutory requirement), to report incidents relating to severe adverse reaction and events relating to blood component administration, in line with the Irish National Accreditation Board (INAB): Minimum requirements for Blood Bank Compliance with Article 14 (Traceability) and Article 15 (Notification of Serious Adverse Reactions and Events)

Reporting and Records

Incidents reported by the Pathology Department are reported, using the National Incident Management Forms (NIMS) forms, in line with the HSE Incident Management Framework – Guidance:

- National Incident Report Form (NIRF) - 01 Person
- National Incident Report Form (NIRF) - 04 Complaint/Dangerous Occurrence.

Incidents relating to severe adverse reaction and events for blood component administration, are reported to the National Haemovigilance Office, by the Transfusion Surveillance Officer as per Haemovigilance procedure Management of Adverse Reactions, Adverse Events, Non Conformances and Investigations by the Transfusion Surveillance Officer (TSO) Midland Regional Hospital Portlaoise (P/BT/HV/036).

All near miss events occurring in the Hospital Blood Bank are reported to the National Haemovigilance Office by the Senior/Chief Medical Scientist in Blood Transfusion, in line with the procedure for Reporting a Near Miss Event to the National Hospital Office (P/BT/LI/031).

Incidents that resulted, or could have resulted in harm to a patient, are captured and documented as non-conformances. Records of actions taken to mitigate harms are documented on the non-conformance form.

The identification and control of non-conformities is managed by the laboratory's procedure for the Control of Service/System Non Conformance (P/QA/SOP/021) and the Haemovigilance procedure Management of Adverse Reactions, Adverse Events, Non Conformances and Investigations by the Transfusion Surveillance Officer (TSO) Midland Regional Hospital Portlaoise (P/BT/HV/036).

Communication

Incidents are communicated to the relevant Laboratory Consultant, Clinical team/GP by a Medical Scientist.

Incidents are communicated to patients by the clinical team/GP and relevant Laboratory Consultant where required.

The Laboratory does not communicate directly with patients.

3.13 Discrimination

The Pathology Department is committed to upholding the rights of patients to care that is free from discrimination.

The Pathology Department makes a major contribution to patient care, and in all its activities, the patient is the primary focus. Refer to section 1.0 for the Laboratory Quality Policy.

The Laboratory service is a HSE funded service which is funded from Hospital budget and Primary Care budget for GP's.

All patient samples are processed without discrimination.

There is no direct patient invoicing for HSE funded Laboratory services.

3.14 Tests reports

Test reports for all results whether processed in-house or externally by our Referral Laboratories are returned to the Clinician /GP in as soon as they are available.

The Pathology Department management ensure that Laboratory services, including appropriate advisory and interpretative services, meet the needs of patients and those using the Laboratory services.

Laboratory services are outlined in this document the Laboratory User Handbook

The Pathology Department has documented procedures for the release of examination results including details of who may release results and to whom.

The Laboratory does not report test examination results directly to patients.

The Laboratory makes relevant information available the health service provider at the request of the patient or the request of a healthcare provider acting on their behalf.

A centralised results enquiry service for validated and printed reports is available from the main Laboratory office Monday- Friday, 09:00 to 17:00

All other enquiries are referred to the appropriate department.

Refer to section 13.0 for further information on reporting results.

All FOI (Freedom of Information), GDPR/Subject Access Requests should be forwarded to the FOI Office at **mrhp.recordsrequests@hse.ie**
Requests received directly from patients are referred to the Freedom of Information (FOI) office from the Laboratory.

3.15 Turnaround Time for Test Requests

The turnaround time is the time from specimen receipt in the Pathology department to the time results are validated and available to the requestor.

Test reports for all results whether processed in-house or externally by our Referral Laboratories are returned to the Clinician/GP in as soon as they are available.

The expected Turnaround time (TAT) for test requests is specified in the table of laboratory tests/profiles carried out in each department. Refer to the following:

Section 7.0 for Table of Biochemistry Tests

Section 8.0 for Table of Haematology Tests

Section 9.0 for Table of Blood Transfusion Tests

Section 10.0 for Table of Microbiology Tests

Section 11.0 for Histology and Cytology for details on Histology and Cytology specimen requirements

Section 14.0 Point of Care Testing

Section 15.0 for Table of Tests Referred to External Laboratories

3.16 Privacy Notice

When you have a sample taken for processing in the Pathology Department in the Midland Regional Hospital, Portlaoise, you will give us some personal data. This includes data such as your name, address, date of birth, and relevant healthcare information. The Pathology Department in a HSE funded Laboratory and is the data controller for your personal data. We will keep your personal data safe and private. We will follow data protection laws for storing and using your personal information. We use this data to process the test request from your physician (or other clinical personnel responsible for your care).
We may also use it to:

- Notify your physician (or other clinical personnel responsible for your care) when examination results for critical properties fall within established "alert'' or "critical" intervals.
- Refer samples to external referral laboratories if required for further testing. This is only done where a clinician has requested a specific test not provided on site or if there is a genuine need in order to ensure the highest quality of care.
- Release information in fulfilment of our responsibilities as a public health service as detailed in the Laboratory User Handbook.

We will follow the HSE's data protection policy. You can find out more about your data protection rights and how to use them at www.hse.ie/gdpr

3.17 Laboratory Test/ Profile Description

Each laboratory test will be described under the following headings:-

- **Test Name**
  Full name of the test
- **Test code**
  The abbreviated name for test commonly used where relevant.
- **Specimen**
  The type of specimen required is stated.
- **Volume**
  The volume of the required specimen container is stated.
- **Sample Container**
  The type of container/additive is stated.
- **Container Colour**
  A colour picture of the container is shown
- **Colour**
  The colour of the container is stated

  Use appropriate small paediatric bottles for children/infants.

- **Turnaround time**
  Turnaround time is defined as the time from specimen receipt in the Pathology Department to the time results are available.
  1 day refers to 1 routine working day.

- **Comment**
  Comment identifies any further action required when requesting or taking a particular specimen. Special requirements are detailed where necessary including but not limited to:
  - Patient preparation, e.g. fasting
  - Consent form
  - Special timing for collection of specimens e.g. pre and post drug administration
  - Any special handling needs between time of collection and time received by the laboratory (transport requirements, refrigeration, warming, immediate delivery etc.)

3.18 Repeat Examination due to Analytical Failure

It is the policy of the Pathology department in the event of an analytical failure to:-

- Repeat the test using a back-up instrument.

or

- Store the specimens in appropriate conditions until the cause of the analytical failure is identified and corrected and then repeat the test. The urgency of the outstanding specimens is reviewed by the relevant laboratory Consultant or nominee.

3.19 Emergency Out of Hours Service

This service is for genuine medical emergencies ***only***, where the results are likely to influence immediate management of the patient.
The Pathology Department in MRH Portlaoise provides an emergency out of hours service (On Call Diagnostic Service) for urgent requests.

- Monday to Friday, 20:00 – 08:00
- Saturday / Sunday / Bank Holidays (24 Hours)

Two members of the technical staff cover all disciplines
One Medical scientist for the Biochemistry /Microbiology Rota
One Medical scientist for the Haematology /Blood Transfusion Rota

On call staff **must** be contacted by phone for all on call emergency requests.
The Medical Scientist on call for Biochemistry/Microbiology is contacted on the laboratory 'on call' mobile phone, speed dial *51769 (087 2511468).

The Medical Scientist on call for Haematology/Blood Transfusion is contacted on the laboratory 'on call' mobile phone, speed dial *51775. (087 6394811)

Alternatively the Medical Scientist on call can be contacted through the switch board (dial 3000).

Request Forms
Emergency on call request forms are provided to the clinical areas for Biochemistry and Haematology test requests.

- Biochemistry Green On Call Form
- Haematology Pink On Call Forms
- Microbiology routine form
- Blood Transfusion routine form

Emergency on call forms **must** be fully completed.
A **request form** must accompany each specimen and must be fully completed and legible.
Ensure specimen(s) and form(s) are sent to the laboratory ASAP via the pneumatic tube system to:
Destination number 001 for Biochemistry/Microbiology
Destination number 012 for Haematology/Blood Transfusion
Refer to section 5.2.1 for exceptions and Instructions for use of the pneumatic Tube system.

Results
Results of tests performed on site during emergency service hours are available on the Laboratory ward look up System (excluding Blood Transfusion).
Critical results are phoned/faxed to the relevant ward as per laboratory procedure P/QA/SOP/041 Criteria and Procedure for Phoning Critical Results.

Urgent Test Requests

Contact the laboratory regarding critical urgent samples.
Urgent test requests must be telephoned to the laboratory so that tests can be given priority.
The turnaround time for phoned emergency requests is 1 hour on receipt of specimen in laboratory.

If any other test is required the person requesting the test should contact the relevant Laboratory Medical Consultant or Chief/Senior Medical Scientist to request the test

3.20 Pathology MRH Portlaoise General Test Portfolio Guide

	Test	Sample Type	Sample No.	Special Requirement
MRH Portlaoise Biochemistry	RENAL (Sodium, Potassium, Chloride, Urea, Creatinine, eGFR)	Serum	1 Serum	Full Bottle
	LIVER (AST, ALT, Total Bilirubin, Albumin, Alk Phos, GGT))	Serum		
	LIPIDS (Cholesterol, Triglyceride, HDL, LDL)	Serum		
	CRP	Serum		
	AMYLASE	Serum		
	BONE (Calcium, Magnesium Inorganic Phosphate, Albumin, Alkaline Phosphatase, Corrected Calcium)	Serum		
	CARDIAC ENZYMES (Creatinine Kinase)	Serum		
	LITHIUM	Serum		
	LDH	Serum		
	DIRECT BILIRUBIN	Serum		
	Rheumatoid Factor	Serum		
	URIC ACID	Serum		
	TROPONIN T	Serum		
	IRON/IRON STUDIES	Serum		
	Nt pro BNP	Serum		Criteria requirements
	GENTAMICIN	Serum		Indicate Pre/Post dose
	Human Chorionic Gonadotropin (hCG+β)(Total hCG)(Pregnancy)	Serum	1 Serum	Clinical details **MUST** be stated
	GLUCOSE	Fluoride Oxalate	1 Fluoride Oxalate	
	LACTATE	Fluoride Oxalate	1 Fluoride Oxalate	Time sample taken **MUST** be indicated. **MUST** be processed within 15 minutes of collection. Lactate is available on hospital Blood gas analysers.
	VANCOMYCIN	Lithium Heparin	1 Lithium Heparin	
MRH Portlaoise Haematology	FBC/FILM/ESR/MONOSPOT	EDTA	1 EDTA	
	COAG / D DIMER / FIBRINOGEN	Sodium Citrate	1 Sodium Citrate	Indicate Time taken. Fill to level.
MRH Mullingar Endocrinology	B12	Serum	1 Serum	Clinical Indication Form.
	FOLATE	Serum		
	TFT	Serum		Full Bottle *Testosterone (Female) separate sample
	FERRITIN	Serum		
	FSH	Serum		
	TFT	Serum		
	FERRITIN	Serum		
	LH	Serum		
	PROLACTIN	Serum		
	OESTROGEN	Serum		
	TESTOSTERONE*	Serum		
	PSA	Serum		
	CORTISOL	Serum		
	SODIUM VALPORATE	Serum		
	HBA1C	EDTA	1 EDTA	
	PROGESTERONE	Serum		
	T3	Serum		
	T4	Serum		

	Test	Sample Type	Sample No.	Special Requirement
MRH Mullingar Immunology	Auto Antibodies	Serum	1 Serum	*Note:* **Separate Biochemistry Serum Sample required for Serum Protein Electrophoresis (Protein and Albumin)
	Allergy Screen	Serum		
	TPO Antibodies	Serum		
	Immunoglobulins	Serum		
	Serum Protein Electrophoresis**	Serum		
	C3/4	Serum		
	A1AT	Serum		
	B2M	Serum		
	Caeruloplasmin	Serum		
	Coeliac Screen	Serum		
	Haptoglobins	Serum		Hospital Only
	ANA	Serum		
MRH Mullingar Microbiology	Haemachromatosis Genetic Test	EDTA	2 EDTA Bottles	Haemachromatosis Consent Form
MRH Tullamore Biochemistry	AFP		1 Serum	1 Full Bottle Do not request tumour markers for health screening. Appropriate clinical details required.
	CEA			
	CA 125			
	CA 15.3			
	CA 19.9			
	HCG (Tumour marker)			
National Virus Reference Laboratory	Viral antibody/antigen	Serum		Specific viral investigation MUST be stated.
	Lyme Disease	Serum		
	Syphilis	Serum		
St. James' Hospital Dublin	ANCA	Serum	1 Serum	
	Anti CCP	Serum		
	Light Chain Assay	Serum		
	Serum Osmolality	Serum	1 Serum	
	Urine Osmolality	Urine	1 Random Urine	
External Laboratories	Most Common Test Requests Listed – refer to Section 15.0 for full listing			
	Vitamin D	Serum	1 Serum	
	Parathyroid Hormone	Serum	1 Serum	Time of sample collection MUST be stated. Must arrive in Lab within 4 hours of sampling. Must be in Lab before 16:00 Mon-Fri (Exc BH)
	H Pylori	Serum	1 Serum	
This is **NOT** an exhaustive list of tests available. Please refer to the Laboratory User Handbook Section 15.0 for tests referred to External Laboratories or contact the Laboratory Office 057 86 96270 for further information.				

3.21 Tests Available On-Call

Department	Tests Available	Comment
Haematology	Full Blood Count (FBC)	
	Erythrocyte Sedimentation Rate (ESR)	Only if indicated by clinical findings
	Retics	Only if indicated by clinical findings
	Infectious Mononucleosis	Only if indicated by clinical findings
	Kleihauer test	Only if indicated by clinical findings
	Blood Film	Only if indicated by clinical findings
	Malaria Screen	Only if indicated by clinical findings
	Sickle Cell Screen	Only if indicated by clinical findings and for urgent theatre case only.
	Prothombin Time (PT) International Normalised Ratio (INR) Activated Partial Thromboplastin Time (APTT)	Only if clinical findings or history indicates a coagulation defect.
	D Dimer	Clinical details should be provided
	Fibrinogen	Only in cases of DIC or massive haemorrhage
Blood Transfusion	Group and Hold	Emergencies only, not elective surgery
	Group and Crossmatch	Emergencies only, not elective surgery
	Cord Bloods	Only at weekends
	Group and Coombs	
Biochemistry	Alcohol	
	Amylase	
	Bilirubin (Total/direct)	
	Calcium	
	Cardiac Enzymes	Creatinine Kinase (CK) only
	C Reactive Protein (CRP)	
	Gentamycin	
	Glucose	
	Human Chorionic Gonadotropin (hCG+β) (Total hCG)	Only if indicated by clinical findings. The Consultant Obstetrician must contact On-Call staff directly
	Iron	
	Lactate	
	Lipids	Cholesterol, Triglyceride, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL)
	Lithium	
	Lactate Dehydrogenase (LDH)	
	Liver Function Test (LFT)	Alanine Amino Transferase (ALT) Aspartate Amino Transferase (AST) Gamma Glutamyl Transferase (GGT) Alkaline Phosphatase (ALK Phos) Total Bilirubin Albumin
	Magnesium	
	Paracetamol	
	Phosphate	
	Salicylate	
	Troponin T	State time interval between patient admission and sample collection 0hr, ≤3hr
	Urea Electrolytes and Creatinine (U&E)	Urea, Creatinine, Sodium, Potassium, Chloride, Estimated Glomerular Filtration Rate (eGFR)
	Uric acid	
	Vancomycin	
	Urine Drugs of Abuse	Amphetamines, Metamphetamines, Benzodiazepines, Barbiturates, Cocaine, Methadone, Tricyclic Antidepressants, Marijuana
	Protein Creatinine Ratio/Estimated 24 hour urinary protein/Spot Protein.	Only if indicated by clinical findings. The Consultant Obstetrician must contact On-Call staff directly
	Cerebral Spinal Fluid (CSF) Glucose	
	Cerebral Spinal Fluid (CSF)Protein	

Microbiology	Cerebral Spinal Fluid (CSF)	Microscopy
	Midstream Urine (MSU)	Paediatric Specimens only
	Blood Cultures	
	Covid 19/Flu/Respiratory Syncytial Virus (RSV)	Urgent Samples for same day testing must be received before 23:00 weekdays. SAT/SUN/BH before 13:00
	CPE	9:00 to 11:00 Sat/Sun/Bank Holidays

3.22 Pathology Supplies

Pathology supplies including specimen bottles, request forms and 24 hour urine containers may be obtained from Laboratory Reception **ONLY** during routine working hours.

Orders may only be collected during routine working hours. This is for the safety of the laboratory staff.

Service users should send a written request to laboratory reception for Laboratory stock. Please fax requests for laboratory stock to the laboratory office (Fax number 057 8696272) or in person at laboratory reception.

Such requests are only to be made during routine hours Monday-Friday (excluding bank holidays). Orders for laboratory stock will only be processed during routine hours and may take up to 2 working days.

Users of the Laboratory service are advised to:

- **Avoid overstocking in order to minimise the wastage of blood bottles and swabs.**
- **Please check the expiry date on new stock.**
- **Ensure laboratory sample bottles/ swabs with the shortest expiry date are used first i.e. Rotate stock.**
- **Discard any items which have expired.**
- **Samples sent to the laboratory using expired sample bottles/swabs will be rejected.**

4.0 LABORATORY REQUEST FORMS, SPECIMEN BOTTLES AND CONTAINERS

Each request form accepted by the Laboratory for examination(s) is considered an 'agreement'. The agreement between customers and users (internal/external users), and the laboratory is defined by the relevant laboratory request form used to requisition the laboratory services.

The required test request forms/specimen bottles and containers, and how they are to be completed/labelled are detailed in Section 4 below.

Agreements to provide medical laboratory services take into account the request for the test examination and the specimen/container provided.

All test request forms and samples/containers received are reviewed on receipt to confirm acceptance (pass incoming inspection). Each request form accepted by the Laboratory for examination(s) is considered an 'agreement'.

On rejection of an agreement (failed incoming inspection), the customer/user is informed by a written report detailing the reason for rejection and/or phoned/faxed. A repeat specimen and form may be requested as per requirements.

A report is provided for all test examination results.
Refer to Section 13.0 for Reporting of test examination results.

4.1 Patient Identification and Specimen Collection

The patient's identity **must** be positively confirmed prior to the completion of the request form and reserving of the specimen.
Ask the patient to state his/her name and Date of Birth, and check the patients stated details against their identity band.

All Portlaoise Identity bands are clearly labelled with Midland Regional Hospital Portlaoise to differentiate them from other hospital bands.

If the patient is not wearing an identity band, the blood specimen must not be taken until one is applied (in-patients only). If at any stage an identity band is removed e.g. for cannulation then it is the responsibility of the person who removed it to ensure a new identity band is replaced immediately.

The laboratory uses the SARSTEDT Monovette system for blood collection and has a number of different request forms. These are used for different pathology analyses as outlined in section 4.3. It is important that the correct specimen is supplied for a particular test.

Phlebotomists, Doctors, registered nursing staff, registered midwives or parents who have completed an approved training course may carry out venepuncture in the Midland Regional Hospital Portlaoise.
The Electronic Blood Tracking System is the preferred method for labelling inpatient samples and request forms. Hand held devices are available in all clinical areas.

It is the responsibility of the doctor or trained nurse taking the blood to:

- Inform the patient of the procedure that is to be carried out and gain consent when required.
- Check Patient identification.
- Ensure the patient is fasting if required.
- Take blood into the appropriate specimen container for the tests required using recommended order of draw. Section 4.3.3
- Label the specimen container.
- Ensure the form is properly completed.
- Ensure specimen is sent to the Laboratory within the appropriate time frame.

Samples Collected by Patients
It is the responsibility of the doctor or trained nurse advising a patients to collect samples

- Inform the patient to complete the details on the request form/sample

Refer to section 9.0 for details pertaining to specimen collection for Blood Transfusion.

4.2 Request forms

A request form must accompany each specimen and should be fully completed and legible. It is important that the correct form is supplied for a particular test. **If using Addressograph Labels, these must be placed on every page of the request form.**

It is the policy of the Laboratory in MRH Portlaoise to use the primary sample for test examinations.
A separate sample is required for test requests in each department. A separate sample is required for test requests for each referral laboratory.

Note:
1) For Dynamic tests or timed specimens, ensure a request form is completed for each specimen.

2) **For External tests**
NOTE: A separate sample is required for Endocrinology test requests.
A separate sample is required for Immunology test requests.
Another separate sample is required for each External test requests.

Refer to section 15.0 for Table of Tests Referred to External Laboratories

4.2.1 Request forms in Use

Reference Number		Request Form	Description
P/PATH/LF/001		General Request Form for Haematology, Coagulation, Biochemistry and External tests	White multileaf form with a blue stripe across the top
P/MIC/LF/001		Microbiology	White multileaf form with Green stripe across the top
P/BT/LF/001		Blood Grouping/Cross Matching/DAT & Cord testing/ issue Blood products	White form with Red background, Black stripe across the top
P/BT/LF/009		Order Form for Additional Blood, Blood Components or Products when a valid sample is already in the Lab	Yellow A4 request form

Reference Number		Request Form	Description
P/PATH/LF/012		Biochemistry Emergency Request Form	Green Form
P/PATH/LF/013		Haematology Emergency Request Form	Pink Form
		Histology/Cytology	White MRH Tullamore form
		Antenatal Antibody screen	MRH Mullingar Pink form
		Cervical Smears	Cytology Form Cervical Check Form for National Cervical Screening.

4.2.2 Completing all Request Forms

Refer to section 9.0 for information regarding completion of Blood Transfusion Request Forms.

The following essential information must be documented in a legible manner on the request form including all duplicates:-

1. Patient's Full Name (Surname, Forename)
2. Patient's Date of Birth (tests will not be reported if DOB is not given)
3. Patient's Hospital Number (if available)
4. Patient's gender
5. Examination(s) required
6. Patient's Location (Hospital Ward). If the requesting Physician is at a location external to the Midland Regional Hospital, at Portlaoise the postal address of the requestor should be included.
7. The name of the requesting Doctor/GP

The following information should be documented in a legible manner on the request form including all duplicates.

1. Patient's Full Home Address (if available)
2. Date and time of specimen collection (e.g. Troponin, Coagulation)
3. Specimen type and anatomical site where appropriate
4. Relevant clinical information appropriate to the test(s) requested must be supplied e.g. date and time of clinical symptom onset, history of administration of drugs, antenatal history, blood transfusion history etc.
5. A clear indication as to whether the tests requested are urgent or routine. All tests are treated as routine unless indicated otherwise by Clinician/Nurse.
6. The signature of the person who took the specimen and contact Number where appropriate.
7 Patient Contact number (GPs only)

The Electronic Blood Tracking System is the preferred method for labelling inpatient samples and request forms. Hand held devices are available in all clinical areas

Note: Some of the laboratory request forms have more than one page. If using Addressograph Labels, these must be placed on every page of the request form.

4.3 Specimens

4.3.1 Sampling System in Use

The **SARSTEDT Monovette system** for blood collection is used in the Midland Regional Hospital Portlaoise. The following blood bottle types are most commonly used. Please ensure bottles are within their expiry date. Samples sent to the laboratory using expired sample bottles will be rejected.
Note the bottles are also available in a smaller size for Paediatric use.

Blood Culture bottles: Refer to section 10.5 of this manual

Green*:		Contains trisodium citrate and **must be filled to the line** with blood. This bottle is used for PT/INR/APTT/D-Dimers/ Fibrinogen. (Please ensure that a full sample is taken and mix well by inverting sample 4 to 5 times) Underfilled tubes will be rejected
White:		SERUM: Contains no anticoagulant or gel. This bottle is used for Biochemistry and external tests.
Brown:**		SERUM: Contains an inert polymer gel This bottle is used for biochemistry and external tests.
Orange:		PLASMA: Contains Lithium heparin. This bottle is used for, Vancomycin, Biochemistry and external tests.
Red:		Haematology EDTA. This bottle is used for full blood counts, ESRs and HbA1C's and some external tests. (mix well by inverting sample 4 to 5 times)
Red:		Blood Transfusion EDTA bottles (mix well)
Yellow:		Contains fluoride/oxalate. This bottle is a used for: Blood glucose (mix well by inverting sample 4 to 5 times) Lactate tests (Contact Laboratory in advance and send immediately to the laboratory).
Dark Red		Dark Red Thromboexact Tube. Contains magnesium. This tube is used for platelet estimation.

.*Recommended to draw a discard tube first when a citrate tube is the first tube needed. *Refer to Section 4.3.3 (Order of Draw)*

**** It is the policy of the Laboratory in MRH Portlaoise to use the primary sample for test examinations.
A separate sample is required for test requests in each department. A separate sample is required for test requests for each referral laboratory.

A separate sample is required for Endocrinology test request.
A separate sample is required for Immunology test requests.
Another separate sample is required for each External test requests. (Refer to section 15.0)

For further details on blood collection refer to:
1) Blood Sampling by Venepuncture procedures on Hospital Q Pulse
2) Peripheral Intravenous Cannulation procedures on Hospital Q Pulse
3) Procedure for taking Blood Cultures. Refer to Infection Prevention and Control (IPC) National Clinical Guideline No. 30.
4) Phlebotomy Service (Refer to section 12.0 of this manual)

4.3.2 Specimen Contamination

Anticoagulants present in specimen bottles may cause problems if carried over from one type of container to another.
Cross contamination should not occur if the Monovette system is used as designed, as the caps are not removed from the tubes. The bottles will automatically fill with blood to the appropriate fill-line due to the vacuum. The bottles are siliconised to reduce adhesion of clots to the tube walls and cap, and to reduce the risk of haemolysis.

Fill specimen bottles in the correct order (section 4.3.3) to avoid contamination.
If caps are removed, replace on correct bottles.

Blood culture bottles are easily contaminated. Always fill blood culture bottles first. Refer to Infection Prevention and Control (IPC) National Clinical Guideline No. 30.

Never take specimens from close to a drip site, venesection bag etc

4.3.3 Order of Draw for Specimen Bottles when using the Sarstedt Monovette System

The guidelines for order in which blood specimens should be drawn are as follows:

Blood Culture Bottles (if required)

<table>
<tr><th>*Order of Draw</th><th>Colour</th><th>Commonly Ordered Analytes</th></tr>
<tr><td>Discard Tube
(When first sample is for Coagulation)</td><td> 
Green</td><td>To avoid under filing for citrate tubes for coagulation analyses due to dead volume in the sampling tubing.
Use a tube (citrate/neutral) first to fill/vent the tubing, and then discard (empty tube/discard tube). Only then is the actual citrate tube to be used.</td></tr>
<tr><td>1
Sodium Citrate</td><td> 
Green</td><td>Coagulation Screen, D-Dimers, Fibrinogen
<u>Please ensure that full sample is taken and mix well by inverting sample 4-5 times</u>
<table>
<tr><th colspan="6">Coagulation Test Stability</th></tr>
<tr><td>Test</td><td>PT</td><td>APTT</td><td>APTT for UFH</td><td>FIB-C</td><td>D-Dimer</td></tr>
<tr><td>Stability</td><td>24Hr</td><td>4Hr</td><td>4Hr*
*Centrifuge within 1Hr</td><td>4Hr</td><td>8Hr</td></tr>
<tr><td>Temperature</td><td colspan="5">Room Temperature</td></tr>
</table>
UFH = Unfractionated Heparin</td></tr>
<tr><td>2
Serum</td><td>White
Bottle Top</td><td>Copper, Chromogranin A, Methotrexate, Toprimate, Topomax, Neurotonin, Keppra, Lamotrigine, Medication Quantifications Samples</td></tr>
<tr><td>3
Serum Gel</td><td> 
Brown</td><td>General Biochemistry, Gentamicin (indicate Peak or Trough), Troponin-T, Immunology, Viral (specify virus), Drugs, PTH, Tumour Markers, Lithium, Endocrinology

Underfilled tubes may be rejected</td></tr>
<tr><td>4
Lithium Heparin</td><td> 
Orange</td><td>Vancomycin, Chromosome Analysis, Metabolic Screen

Underfilled tubes may be rejected</td></tr>
<tr><td>5
K-EDTA</td><td> 
Red</td><td>Full Blood Count (FBC), Erythrocyte Sedimentation Rate (ESR), Renin, Cyclosporin, DNA Analysis, HLA Typing, PCR, Prograf/Tacrolimus, Haemochromatosis Screening (mix well by inverting sample 4-5 times)</td></tr>
<tr><td>6
Sodium Fluoride</td><td> 
Yellow</td><td>Glucose (mix well by inverting samples 4-5 times)

Lactate (contact Laboratory in advance and send immediately to Laboratory),</td></tr>
</table>

This list only covers some commonly ordered analytes

Reference: Sarstedt Order of Draw, Tips and Techniques in Preanalytics 2018 (20-453-0100-142)

4.3.4 Labelling the Specimen Container

Refer to section 9.0 for information regarding completion of Blood Transfusion Specimen.

The Electronic Blood Tracking System is the preferred method for labelling inpatient samples and request forms. Hand held devices are available in all clinical areas.

The following essential information must be documented in a legible manner on the specimen container (DO NOT put large addressograph labels on specimen containers. Refer to section 4.6):-

1. Patient's Full Name (surname and forename)
2. Date of Birth

The following essential information should be documented in a legible manner on the specimen container

1. Hospital no (if available)
2. Patient location
3. Date and Time of Sampling
4. Where appropriate, type/source of specimen and anatomical site of origin

All specimens must be identifiable.

When several samples from the same patient are to be collected each one must be labelled including multiple pieces of tissue or slides.

Unlabelled specimens are not processed. Refer to section 4.6 of this document.

Specimens should be transported to the laboratory as soon as possible after collection to ensure that no significant deterioration occurs before processing.

Regrettably specimens may have to be discarded if the patient's identification is in doubt i.e. if they have leaked or have been contaminated. In these circumstances every effort is made to inform the requesting doctor. Refer to section 4.6 of this document.

4.3.5 High Risk Specimens

Specimens that carry a high risk of infectious disease MUST include clinical details on the request form. High risk categories include:

- Patient from high risk group
- Drug Addiction
- Known HIV, Hepatitis etc

4.4 Disposal of Waste Materials used in Specimen Collection

All materials used in specimen collection should be treated as potentially hazardous and discarded using sharps containers and other appropriately colour coded bags/bins.

4.5 Quality of Specimens

Laboratory personnel inspect each blood specimen during testing for:-

- Evidence of Haemolysis
- Gross Lipeamia
- Presence of clots in FBC, ESR and coagulation specimens
- Correct volume
- Icteric samples
- Contaminated/haemodilute specimens
- Cold agglutinins
- Expiry Date

In such instances, a **second specimen** may be requested or the **issued report** will have an appended comment as appropriate.

4.6 Non-Conforming Specimen Bottles, Forms or Specimen Quality Issues

Where the requirements with respect to labelling the request form and specimen container or specimen quality issues are not met the following acceptance/rejection criteria will apply:-
(Refer to section 9.0 for requirements for Blood Transfusion specimen/form labelling.)

	Specimen Issues	**Action**	**Documentation**
1	No Specimen received	Reject.	Report will show non conforming event.
2	Unlabelled specimen	Reject.	Report will show non conforming event.
3	Incorrect specimen	Reject.	Report will show non conforming event.
4	Incorrect forename or No Forename	Reject.	Report will show non conforming event.
5	Incorrect surname or No Surname	Reject.	Report will show non conforming event.
6	Completely different D.O.B or No D.O.B	Reject.	Report will show non conforming event.
7	Forename, 1st initial only.	Reject.	Report will show non conforming event.
8	Incorrect D.O.B. **(One digit change only**)	Written verification. Accept.	Report will show evidence of amendment.
9	Misspelled name **(One letter change only)**	Written verification. Accept.	Report will show evidence of amendment.
10	First name abbreviated e.g. Joe for Joseph, Mgt for Margaret, may be on form and/or specimen	Accept	Comment on Report will show use of abbreviated name.
11	Incorrect Hospital Number or no Hospital Number on the sample	Accept.	A minimum of 2 identifiers Name (Surname, Forename) and Date of Birth is required. Confirm patient name and date of birth match the request form. See table regarding request form issues.

Acceptance/Rejection for Specimen Reception

	Request Form Issues	Action	Documentation
1	No Request Form received	Reject.	Report will show non conforming event.
2	Incorrect forename or no forename	Reject	Report will show non conforming event.
3	Forename, 1st initial only.	Reject.	Report will show non conforming event.
4	Incorrect surname or no surname	Reject	Report will show non conforming event.
5	Incorrect D.O.B or No D.O.B	Reject	Report will show non conforming event.
6	Incorrect D.O.B. **(One digit change only**)	Written verification. Accept.	Scan Data Confirmation form. Report will show evidence of amendment.
7	Misspelled name **(One letter change only)**	Written verification. Accept.	Scan Data Confirmation form. Report will show evidence of amendment.
8	No Laboratory Test requested	Written verification. Accept.	Written request scanned to DART as evidence.
9	No Gender on form.	Confirm gender on iPMs. If Gender is not available on iPMs, confirm gender with requestor.	Report will show correct gender.
10	First name abbreviated e.g. Joe for Joseph, Mgt for Margaret, may be on form and/or specimen	Accept	Comment on Report will show use of abbreviated name.
11	No name of the requesting Doctor	Verbal verification. Accept.	Report will show evidence of amendment.
12	No Patient's Location (Hospital Ward).	Verbal verification. Accept.	Check with Hospital Reception Report will show correct Location
13	No Date/time Specimen taken for time sensitive laboratory test requests.	Verbal verification. Accept.	Report will show evidence of amendment.
14	Addressograph labels not identical on all parts of the request form	Reject	Report will show non confirming event
15	Details for two different patients on the request form (eg Two different patient labels or handwritten details different to patient labels used)	Reject	Repot will show non conforming event
16	Incorrect hospital number or no hospital number	Accept	Confirm patient name and date of birth match the sample. Do not enter hospital number. If iPMS is pulling in incorrect details, please contact – Patient Services Manager to correct iPMS

Note: Emergency cases or where the specimen cannot be replaced, the requesting physician or person responsible for the primary specimen collection takes responsibility for identifying and accepting the specimen. The signature of the person taking responsibility for the primary specimen identification must be recorded on the disclaimer form.

Specimen Appearance/ Quality Issues	Action	Documentation
➢ Evidence of Haemolysis ➢ Gross Lipemia ➢ Icteria ➢ Specimen under filled/overfilled ➢ Age of specimen ➢ Contaminated/Haemodilute specimens	➢ The Pathology Department will make a decision on whether or not the specimen is suitable for testing and a second specimen and request form is requested as appropriate. ➢ The Pathology Department may report results within a multi test profile on analytes unaffected by the specimen quality, while not reporting affected analytes in the profile.	Report will show non conforming event.
➢ Presence of clots in specimens requesting FBC, ESR and coagulation tests. ➢ Leaked/Contaminated specimens.	➢ Reject	Report will show non conforming event.
➢ Incorrect specimen bottle/ incorrect bottle cap received for test requested	➢ Reject	Report will show non conforming event.
➢ Presence of an addressograph label which hinders the checking of sample quality/volume/interferes with operation of the analyser.	➢ Reject if analyser fails to accept sample	Report will show non conforming event
➢ Sample bottle/swab expired	➢ Reject	Report will show non conforming event.

4.7 Further Additional Testing

If, **further additional testing** is required on a sample already in the Laboratory, please contact the appropriate section of the Pathology department to investigate the feasibility of using the initial specimen for analysis.
Age of specimen/sample quality may impact on the validity of test results.

An additional request form is required for such a request.
Document on the request form, patient demographics, sample date, test request and 'sample already in lab'.

Additional samples may be required if the test required is performed in an external laboratory.

Where results of requested tests suggest further investigation the laboratory may perform additional tests on the primary specimen.

5.0 PACKING AND TRANSPORT REQUIREMENTS FOR SPECIMENS

5.1 General Information

Take standard precautions in the collection, packaging and the delivery of specimens being sent to the Pathology Department for analysis.
Specimens should be packed and transported in accordance with the European Agreement concerning the International Carriage of Dangerous Goods by Road (UNADR) current version.

5.2 Packing and Transport of Specimens (Routine and Urgent)

5.2.1 Packing and Transport Procedure for Specimens within the hospital

1 Place the specimen(s) in the bag attached to the request form where appropriate, remove strip and seal. Where there is no specimen bag attached to the form place the specimen in a plastic Bio-Hazard bag. Insert the request form into the side pocket of the Bio Hazard bag.
NOTE If specimens are known high risk specimens place the form and specimens into another Bio-Hazard bag.

NOTE 1: A pneumatic tube system is installed and is currently in use for all clinical areas in the hospital for the rapid transport of samples to the laboratory (Destination number 001). All specimens may be sent in a pod container via the pneumatic tube system with the exception of:-

- CSF specimens
- Histology/Cytology specimens.
- Thrombophilia screen and coagulation factor assays
- Bronchial Lavage Samples (BAL)

NOTE 2: A porter may be called to:

- Transport specimens unsuitable for transport in the pod container.
- Transport samples to the laboratory if the system is out of order.

2 Put the specimen(s) and request form(s) in the pod container and send to the laboratory.

In the case of an urgent specimen the doctor or a trained nurse who has taken a specimen must send it to the Laboratory by the pneumatic tube system or arrange for a porter to take it to the laboratory reception. **It is the responsibility of the requesting doctor/nurse to alert the laboratory about urgent specimens by telephone to ensure priority processing.**

<u>Send all specimens to the laboratory to ensure processing is carried out in a timely manner and/or samples are stored correctly prior to testing.</u>

3 **Instructions for Use of Pneumatic Tube System**

When display says Ready
Step 1 Insert Carrier
Step 2 Press Destination Number
Step 3 Press PTT
To Stop Operation Press C

Destination Numbers
1 Laboratory
2 Accident and Emergency
3 Paediatrics (Paeds)
4 Medical Male
5 Medical Female
6 Surgical
7 Maternity
8 Day Ward/SAU/MAU
9 Intensive Care Unit (ICU) /Coronary Care Unit (CCU)
10 Outpatients (OPD)
11 Unassigned
12 Haematology/Blood Transfusion On Call
Note: Pods should be returned to the appropriate destination.
When display says INT please wait.
When display says TEST please report to maintenance.

5.2.2 Packing and Transport Procedure for Specimens From Outside of the Hospital

1. Place the specimen(s) in the bag attached to the request form where appropriate, remove strip and seal. Where there is no specimen bag attached to the form place the specimen in a plastic Bio-Hazard bag. Insert the request form into the side pocket of the Bio Hazard bag.
2. Place the specimen(s) and request form(s) in a padded envelope where possible.
3. Label the envelope with a hazard warning note, "Diagnostic Specimen".
4. Place the name, address and contact number of the destination Laboratory on the outside of the envelope.
5. Arrange for the Specimen to be transported to the Laboratory immediately. If specimen must be stored, keep refrigerated between 2°C and 8°C unless otherwise specified.
   Refer to section 5.0.
6. Ask the taxi/courier to ensure that the specimens are not exposed to extremes of temperature during transport.
7. If a patient is delivering specimens to the Laboratory, issue a note to the patient instructing them to deliver the specimen to the Laboratory immediately and to protect specimens from extremes of temperature.

General public, GP's or couriers may drop in specimens to laboratory reception. Routine specimens are accepted between 08:30 and 17:00 on weekdays. Outside of these hours specimens may be dropped through the hatch at Laboratory Reception. To ensure routine processing on the day of receipt, specimens should arrive before 16:00.

Note: Specimens should not be forwarded to the Laboratory by Post as recommended by current ADR regulations.
For details on the procedures for the transport of Infectious or suspected Infectious Specimens for Delivery from inside/outside the Hospital please contact the Laboratory.

Refer to Guidelines for the Preparation for Transport of Patient Specimens and other Biological Materials.

UN 3373 Category B Biological Substances – P650 Packaging Checklist (Liquid Specimens)

1	Is the primary container properly closed and showing no evidence of leakage?	
2	Is sufficient absorbent present within the secondary packaging?	
3	Is the secondary packaging correctly closed to form a leak proof seal?	 
4	Is the outer packaging closed correctly and showing no signs of damage or excessive wear and tear?	 
5	Are the UN 3373 diamond and the words "BIOLOGICAL SUBSTANCE, CATEGORY B" present?	 
6	Are any parts of these markings obscured by tape or other identification labels?	

GD:009:01 Guidelines for the Preparation for Transport of Patient Specimens and other Biological Materials 2023

5.3 Storage of examined specimens

Patient samples or remains are treated with due care and respect by laboratory staff.

Examined Specimens are stored as detailed in the table below

Department	Clinical Material	Storage Temp	Minimum Retention Time*	Source	Comment
Biochemistry	Serum, Plasma other body fluid	4˚C	48 hrs	RCP	
Biochemistry	Aliquots of Serum, Plasma other body fluid	4˚C	48hrs	RCP	*Not suitable for reanalysis*
Biochemistry	24hr Urine/Random Urine	RT	48 hrs	RCP	
Haematology	FBC (EDTA) & Misc tests	4˚C	24 hrs	RCP	
Haematology	Blood Films	RT	1 year	**	**Australian Commission on Safety and Quality in Healthcare
Haematology	Coagulation (sodium citrate)	RT	24hrs	RCP	
Blood Transfusion	Transfusion Samples	4˚C	14 days	RCP	Samples valid 72 hours only
Blood Transfusion	Separated Plasma	-30˚C	14 days	RCP	14 days post transfusion if applicable
Microbiology	Urine	4˚C	48 hrs	RCP	
Microbiology	Sputum	4˚C	48 hrs	RCP	
Microbiology	Body Fluids/Aspirates/Swabs	4˚C	48 hr	RCP	Swabs are held for 7 days for additional testing if required for outbreak management
Microbiology	Faeces	4˚C	48 hrs	RCP	
Microbiology	CSF's	4˚C	48 hrs	RCP	
Microbiology	Blood Cultures	RT	48 hrs	RCP	
Microbiology	Microbiology Slides	RT	See Comment	RCP	*Wet Preparations: Discard* *Gram stains: 7 days* *Other stained slides: 7 days*
Microbiology	Microbiology Cultures/Isolates	RT	See Comment	RCP	*Clinically Significant: 7 days* *Not Clinically Significant: Discard within 24-48 hours*
Microbiology	Microbiology Slopes	RT	See Comment	RCP	*Hold for 48 hours after receipt of the referral laboratory final report.* *Slopes are retained for ~ 6 months*
Microbiology	Freeze dried or other permanent Cultures	-18˚C	Long Term	RCP	*Variable*
Immunology	Serum/Plasma	4˚C	48 hrs	RCP	*Specimens are retained for 7 days*
Virology	Serum from Needle Stick Injury	-18˚C	2 years	RCP	*Stored in NVRL*

*after final report has been issued

5.3.1 Laboratory activities to safeguard patient samples and records

The laboratory is committed to the ongoing availability and integrity of retained patient samples and records in the event of the closure, acquisition or merger of the laboratory.

- The Laboratory is a HSE funded Laboratory and any planned or unplanned closure, acquisition or merger of the laboratory will be coordinated/directed by the HSE.
- Established procedures are in place for the control of clinical material and the control of records. P/QA/SOP/007 'Control of Clinical Material'.
  P/QA/SOP/006 'Control of Process and Quality Records'
- Facilities for off-site storage are available.

In the event of the closure, acquisition or merger of the laboratory:

- Patient samples will be stored on site in line with current retention policy for short term storage up to 14 days.
- Long term storage for clinical material will be agreed by the Laboratory Manager in conjunction with the Hospital Manager and the HSE Regional Executive Office.
- Hard copy records will be stored off site in the off-site storage facility in line with the current records retention policy.
- Retention of electronic records will be stored on a designated server agreed by the Laboratory Manager in conjunction with the IT Business co-ordinator, the HSE Regional Executive Office and the HSE IT National helpdesk.

5.4 Specimen Transport to External Referral Laboratories

Specimens for testing by external referral laboratories are sent daily Monday to Friday (excluding Bank Holidays) by:

- Scheduled Taxi to Regional Hospitals Tullamore and Mullingar at 08:00
- Scheduled Minibus Service to Dublin at 08:00
- Scheduled collection by Eurofins Biomnis at 17:00. Specimens should be in the Laboratory before 16:00 to allow sufficient time for processing.

Specimens for non-deferrable/urgent test requests may be sent outside of these hours by:

- Unscheduled Taxi during the routine working day Monday to Friday
- Unscheduled Taxi / Blood Bikes Service out of hours

This service is for genuine medical emergencies ***only***, where the results are likely to influence immediate management of the patient.

6.0 ADVISORY SERVICES

Clinical Advice
The Pathology Service in Midland Regional Hospital Portlaoise is a Consultant led service. The Laboratory Medical Consultants, Scientific staff and Haemovigilance staff provide extensive advisory services.

There is a Medical Consultant available for the following departments:
Biochemistry
Haematology/Blood Transfusion including Haemovigilance
Histopathology
Microbiology including Infection Control and Surveillance

Consultant personnel welcome direct enquires on clinical matters and encourage consultation about the selection of investigations.

Biochemistry
Biochemistry clinical advice is given by the Consultant Chemical Pathologist. The Consultant Chemical Pathologist is based in St James Hospital, Dublin and may be contacted at 087 4156911 or 01 4162935.

Haematology/Blood Transfusion including Haemovigilance
Haematology/Blood Transfusion (including Haemovigilance) clinical advice is given by:
Consultant Haematologist(s)
Specialist Haematology Registrar (under supervision of the Consultant Haematologist(s))
Transfusion Surveillance Officer (under supervision of the Consultant Haematologist(s))

Two Consultant Haematologist(s) are based at the Midland Regional Hospital at Tullamore may be contacted through the switchboard (*51920 or 057 9321501).

The Transfusion Surveillance Officer (TSO) is based on site and may be contacted 057 8696066 or Bleep 072. 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.

The Transfusion Surveillance Officer and the Blood Transfusion staff report all serious reactions and adverse events and near miss events to the National Haemovigilance Office (NHO) & both participate in compiling the annual report to the Health Products Regulatory Authority (HPRA).

Histology and Cytology
Histology clinical advice is given by the Consultant Histopathologist(s). The Consultant Histopathologist(s) are based at the Midland Regional Hospital at Tullamore may be contacted by phone or email. Refer to section 11.0 for contact details and details on the service provided.

Microbiology including Infection Control and Surveillance
Microbiology clinical advice is given by the Consultant Microbiologist. The Locum Consultant Microbiologist is based in the UK and may be contacted on speed dial *51205

Infection Control and Surveillance
The infection control team are available for education and advice in the acute hospitals, district hospitals and the community.

A Surveillance Scientist co-ordinates the Microbiology surveillance programme for notifiable diseases. All notifiable diseases are reported to the Health Protection Surveillance Centre (HPSC).

The Area Medical Officer co-ordinates the management of notifiable diseases.
Refer to section 10.0 for contact details and details on the service provided.

Scientific Advice
Scientific staff are authorised to give advice on choice of examinations, use of services including required type of sample. Where appropriate, interpretation of results of examinations is provided. Please contact the relevant Department.

7.0 BIOCHEMISTRY

Biochemistry Department
Phone 96267 (057 8696267)

Position	Contact Name	Contact Number	Contact Email
Chief Medical Scientist	Sharon Ayres	057 86 96285	sharon.ayres@hse.ie
Senior Medical Scientist	Barry Lyons	057 86 96267	barry.lyons2@hse.ie
Consultant Chemical Pathologist	Dr Vivion Crowley	087 4156911 01 4162935	

The Biochemistry Department provides a routine service to the hospital and to general practitioners. In addition a referral service for more specialised tests is provided. Refer to section 16.0.
An On-Call service is provided to the hospital only, for processing of non-deferrable/urgent test requests.

7.1 Routine Biochemistry Tests and Profiles

Routine Biochemistry Tests and Profiles are available daily.

Please Use Blue and White General Biochemistry/Haematology Forms

Inpatient Specimens must be received in the department no later than 16:00 to ensure same day analysis.
Urine requests are tested on a batch basis Monday – Friday.
If results are required by a certain time please INDICATE CLEARLY ON THE REQUEST FORM.
Urgent requests must be telephoned to the laboratory so that tests can be given priority.

For Paediatric specimens, please try and provide 1ml of blood in a small paediatric bottle. For very small specimens please indicate the priority of the tests. Ensure the correct order of draw is adhered to in order to avoid sample collection during sample collection. Refer to section 4.3.2 specimen contamination and 4.3.3 order of draw

7.3 Biochemistry Tests and Limitations

Albumin

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements -** None
- **Availability if assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability –** 5 months at 4-8^{0}C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M/F	35-52	g/L
0-4 days	M/F	28-44	g/L
4 days-14 years	M/F	38-54	g/L
14-18 years	M/F	32-45	g/L
Pregnancy	F	23-42	g/L

- **Notes/Limitations**
  Albumin is included in the Liver Profile.
  Albumin is a carbohydrate free protein, representing 55 – 65% of plasma total protein. It maintains plasma colloidal osmotic pressure, transports and stores a wide variety of substances and serves as a source of endogenous amino acids.
  Albumin binds and solubilizes compounds such as bilirubin, calcium, and long chain fatty acids. It also binds toxic heavy metal ions any many drugs, thus a decrease in albumin can have important pharmacokinetic consequences.

  Hypoalbuminaemia is very common in many disease conditions and stems from various factors:
  • impaired synthesis either primary as a result of liver disease, or secondary due to decreased intake;
  • increased catabolism because of tissue damage (severe burns) or inflammation; malabsorption (Crohn's);
  • proteinuria due to nephrotic syndrome;
  • faecal protein loss (neoplastic disease).

  Severe hypoalbuminaemia results when the level is below 25g/L. Hyperalbuminaemia is of little diagnostic significance except in dehydration. No interference was found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. (Cobas Product Insert, Albumin Gen 2, 2011-11, V7)

Microalbumin

- **Specimen –** Random urine, 24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml, 24 hour; 24hr urine collection container
- **Special Requirements** None
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 1-3 days
- **Stability** – 1 month at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

	Gender	Sample Type	Reference Interval	Units
Microalbumin	M/F	2nd morning Urine	0-20	mg/L
Microalbumin	M/F	24 hr Urine	0-30	mg/24hr
Microalbumin/Creatinine Ratio	M/F	Random Urine	0-2.5	

- **Notes/Limitations**

Microalbumin is a non-glycosylated protein with a molecular weight of 66000 daltons. It is synthesized in liver parenchymal cells at a rate of 14 g/day. Quantitatively, albumin is normally the most important protein component (> 50 %) in plasma, CSF and urine. A small, but abnormal albumin excretion in urine is known as microalbuminuria. Causes of microalbuminuria can be glomerular (e.g. due to diabetic microangiopathy, hypertension, minor glomerular lesion), tubular (inhibition of reabsorption) or postrenal. Albumin is also a marker protein for various forms of proteinuria. In selective glomerular proteinuria, 100-3000 mg albumin/g creatinine are excreted in the urine. Non-selective glomerular proteinuria is characterized by elevated excretion of high-molecular weight proteins (IgG more than 10 % of the albumin value). Prerenal proteinuria is recognized by a discrepancy between albumin and total protein (albumin accounting for less than 30 %,with concurrent elevation of total protein). Simultaneous elevation of albumin and microproteins is found in glomerulotubular proteinuria occurring due to overloading of tubular reabsorption in glomerulopathy (e.g. nephritic syndrome), combined glomerular tubulointerstitial nephropathy or in renal failure following diabetic nephropathy or other causes (overflow proteinuria).

Samples collected in Boric Acid unsuitable.
No significant interference from acetone ≤60mmol/L, ammonia chloride ≤ 0.11mol/L, calcium ≤40mmol/L, creatinine ≤0.18mol/L, γ-globulin ≤500mg/L, glucose ≤0.19mmol/L, phosphate ≤70mmol/L, urea ≤0.8mol/L, uric acid ≤5.95mmol/L and urobilinogen ≤378µmol/L. Drugs: No interference has been found at therapeutic concentrations using common drug panels. (Cobas Product Insert, Tina-quant Albumin Gen. 2, 2023-07 V 12)

Microalbumin Creatinine ratio = Microalbumin/Urinary Creatinine(mmol/l)

24 hour urine containers may be obtained from Laboratory Reception.

Acetaminophen (Paracetamol)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability –** 48 hours at 2^0C -8^0C
- **Biological Reference Interval (Reference range) 0-1.2mg/L**
- **Notes/Limitations**
  Acetaminophen is included in the serum Toxicology profile
  Acetaminophen is a common drug used in many preparations due to its analgesic and antipyretic properties. Chronic excessive use can result in hepatoxicity and nephrotoxicity. Overdosage can lead to severe hepatic damage and hepatic failure if untreated. 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. Therefore a rapid and accurate determination of acetaminophen is essential.

  Total protein: No significant interference from total protein up to a concentration of 2.0 g/dL to 12 g/dL. Amitriptyline and Imipramine showed a significant negative interference (≥ 10 %). There is the possibility that other substances and/or factors may interfere with the test and cause unreliable results. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinaemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert Acetaminophen 2021-08, V 6)

Alkaline Phosphatase (Alk Phos)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours
  External Service Users; Monday-Friday excluding Bank Holiday
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability –** 7 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	40-130	U/L
>18 years	F	35-105	U/L
0-1 day	M/F	1-250	U/L
2-5 days	M/F	1-231	U/L
6 days-6 months	M/F	1-449	U/L
7 months-1 year	M/F	1-462	U/L
1-3 years	M/F	1-281	U/L
4-6 years	M/F	1-269	U/L
7-12 years	M/F	1-300	U/L
13-17 years	M	1-390	U/L
13-17 years	F	1-187	U/L
3rd Trimester Pregnancy	F	20-230	U/L

- **Notes/Limitations**
  Alkaline Phosphatase is included in the Liver Profile
  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. Adult males have higher values than females but pregnant females have higher values due to placental ALP secretion. Elevated levels of ALP occur in all forms of cholestasis, particularly obstructive jaundice, diseases such as hepatitis, cirrhosis, malignancy and chemical toxicity; also in bone diseases such as Paget's, osteomalacia, rickets and metastatic carcinoma. Moderate increases are found in Hodgkin's disease, congestive heart failure, ulcerative colitis, hyperparathyroidism, regional enteritis and intra-abdominal bacterial infections.
  Drugs: No interference was found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinaemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Alkaline Phosphatase acc. to IFCC Gen. 2. 2021-10 v9)

Alanine Aminotransferase (ALT)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	8-41	U/L
>18 years	F	6-33	U/L
0-1 day	M/F	4-31	U/L
2-5 days	M/F	4-52	U/L
6 days-6 months	M/F	4-60	U/L
7-12 months	M/F	4-57	U/L
1-12 years	M/F	4-39	U/L
13-17 years	M	4-26	U/L
13-17 years	F	4-23	U/L

- **Notes/Limitations**
  Alanine aminotransferase is included in the Liver Profile
  ALT is a member of the transaminase family, which catalyze the interconversion of amino acids and alpha-keto acids by transference of the amino group.
  Most ALT activity is found in the liver, but significant amounts are found in the kidneys, heart, skeletal muscle, pancreas, spleen and lung. Elevated levels are associated with hepatic diseases, cirrhosis, obstructive jaundice, carcinoma of the liver and chronic alcohol abuse, muscular dystrophy and organ damage. ALT is only slightly elevated in patients who have uncomplicated myocardial infarction.
  In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. No interference has been found at therapeutic concentrations using common drug panels.

  Exceptions:
  Physiological plasma concentrations of Sulfasalazine or Sulfapyridine may lead to false results. Cyanokit (hydroxocobalamin) at therapeutic levels causes significantly lower results. Calcium dobesilate can cause artificially low ALT results at therapeutic concentrations. (Cobas Product Insert, Alanine Aminotransferase acc. IFCC without pyrodoxal phosphate activation, 2022-10 V 9)

α-Amylase (AMYL)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service Users; 24 hours
- **Stability -** 1 month at 4^0C -8^0C
- **Biological Reference Interval (Reference range)** 28-100 U/L
- **Notes/Limitations**
  Amylases catalyse the degradation of carbohydrates such as glycogen, amylose and amylopectin to maltose and glucose.

  Two types of α-amylase exist – a pancreatic (P) and a salivary (S) type.
  The P type is found almost exclusively in the pancreas; the S type is found in salivary glands and also in tears, sweat, amniotic fluid, the lungs, testes and epithelium of fallopian tubes. Determination is of most use in diagnosis and monitoring of acute pancreatitis. Elevated levels also occur in chronic pancreatitis, renal failure, tumours of the lung and ovaries, cerebral trauma, pulmonary inflammation and diseases of the salivary gland. Confirmation of pancreatic origin requires the additional measurement of a pancreatic specific enzyme such as lipase or the P specific amylase (External tests).

  Glucose: No interference from glucose up to 111 mmol/l. Ascorbic acid: No interference from ascorbic acid up to 5.68 mmol/l. Anticoagulants: Interference is found with citrate, fluoride and EDTA. Drugs: No interference was found at therapeutic concentrations using common drug panels. Icodextrin based drugs may lead to decreased amylase values. In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. (Cobas Product Insert,α-Amylase EPS ver. 2. 2022-02 V8)

Aspartate Aminotransferase (AST)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	4-40	U/L
>18 years	F	4-32	U/L
0-1 day	M/F	4-122	U/L
2-5 days	M/F	4-110	U/L
6 days-6 months	M/F	4-84	U/L
7-12 months	M/F	4-89	U/L
1-3 years	M/F	4-56	U/L
4-6 years	M/F	4-52	U/L
7-12 years	M/F	4-51	U/L
13-17 years	M	4-33	U/L
13-17 years	F	4-27	U/L

- **Notes/Limitations**

Aspartate Aminotransferase is included in the Liver Profile
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.
Elevated levels are found with:

- haemolysis (artefactual); severe haemolytic anaemia;
- myocardial infarction, reaching peak levels 2 days after onset
- post trauma or surgery;
- hepatitis; infectious mononucleosis; cholestasis;
- malignant infiltration (though levels may be normal);
- Cirrhosis (though levels may be normal).

Two isoenzymes of AST have been detected, cytoplasmic and mitochondrial. Only the cytoplasmic occurs in normal serum, while the mitochondrial, together with the cytoplastic isoenzyme, has been detected in the serum of patients with coronary and hepatobiliary disease. In patients undergoing renal dialysis or those with vitamin B_6 deficiency, serum AST may be decreased. The apparent reduction in AST may be related to decreased pyridoxal phosphate, the prosthetic group for AST, resulting in an increase in the ratio of apoenzyme and holoenzyme.

In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. Drugs: No interference has been found at therapeutic concentrtions using common drug panels. Physiological plasma concentrations of Sulfasalazine or Sulfapyridine may lead to false results. Cyanokit (hydroxocobalamin) at therapeutic levels causes significantly lower results. (Cobas Product Insert, Aspartate Aminotransferase acc. to IFCC withour pyridoxal phosphate activation. 2022-10 V 9)

Bilirubin-Direct

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)** 0-5 µmol/L
- **Notes/Limitations**

  Bilirubin is formed in the reticuloendothelial system during the degredation of aged erythrocytes. The heme portion from hemoglobin and from other heme-containing proteins is removed, metabolized to bilirubin, and transported as a complex with serum albumin to the liver. In the liver, bilirubin is conjugated with glucuronic acid for solubilization and subsequent transport through the bile duct and elimination via the digestive tract. Diseases or conditions which, through hemolytic processes, produce bilirubin faster than the liver can metabolize it, cause the levels of unconjugated (indirect) bilirubin to increase in the circulation. Liver immaturity and several other diseases in which the bilirubin conjugation mechanism is impaired cause similar elevations of circulating unconjugated bilirubin. Bile duct obstruction or damage to hepatocellular structure causes increases in the levels of both conjugated (direct and uconjugated (indirect) bilirubin in the circulation.

  Drugs: No interference has been found at therapeutic concentrations using common drug panels. Exception: Phenylbutazone causes artificially low bilirubin results. Samples containing indocyanine green must not be measured. In very rare cases, gammopathy, in particular type IgM, may cause unreliable results.

  In certain cases specimens may give a direct bilirubin result slightly greater than the total bilirubin result. This is observed in patient samples when nearly all the reacting bilirubin is in the direct form. In such cases the result for the total bilirubin should be reported for both direct and total bilirubin values. (Cobas Product Insert, Bilirubin Direct Gen. 2 (jendrassik Grof). 2022-06, V 3)

Bilirubin-T

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability** - 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M/F	2.5-21	µmol/L
0-1 day	M/F	2.5-102.6	µmol/L
2-3 days	M/F	102.6-136.8	µmol/L
4-5 days	M/F	171-256.5	µmol/L
6 days-18 years	M/F	2.5-17.1	µmol/L

- **Notes/Limitations**
  Total Bilirubin is included in the Liver Profile
  Bilirubin is formed in the reticuloendothelial system during the degradation of aged erythrocytes. The heme portion from hemoglobin and from other heme-containing proteins is removed, metabolized to bilirubin, and transported as a complex with serum albumin to the liver. In the liver, bilirubin is conjugated with glucuronic acid for solubilization and subsequent transport through the bile duct and elimination via the digestive tract. Diseases or conditions which, through hemolytic processes, produce bilirubin faster than the liver can metabolize it, cause the levels of unconjugated (indirect) bilirubin to increase in the circulation. Liver immaturity and several other diseases in which the bilirubin conjugation mechanism is impaired cause similar elevations of circulating unconjugated bilirubin. Bile duct obstruction or damage to hepatocellular structure causes increases in the levels of both conjugated (direct) and unconjugated (indirect) bilirubin in the circulation.

  Drugs: No interference was found at therapeutic concentrations using common drug panels. Immunoglobulins: No significant interference from immunoglobulins up to a concentration of 28g/l. No significant interference by indican up to concentrations of 0.12mmol/L. Cyanokit (Hydroxocobalamin) may cause falsely low results. Results from certain multiple myeloma patients may show a positive bias in recovery. Not all multiple myeloma patients may show a positive bias and the severity of the bias may vary between patients. In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. Samples containing Indocyanine green must not be measured. (Cobas Product Insert, Bilirubin Total Gen. 3. 2022-02, V 10)

Calcium

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** Serum; 3 weeks at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** - Serum

	Age	Gender	Reference Interval	Units
Calcium	18-90 years	M/F	2.15-2.55	mmol/L
Calcium	≥90 years	M/F	2.05-2.40	mmol/L
Calcium	0-10 days	M/F	1.90-2.60	mmol/L
Calcium	10 days-2 years	M/F	2.25-2.75	mmol/L
Calcium	2-12 years	M/F	2.20-2.70	mmol/L
Calcium	12-18 years	M/F	2.10-2.55	mmol/L
Corrected Calcium		M/F	2.15-2.55	mmol/L

- **Specimen –** Random urine, 24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml, 24 hour; 24hr urine collection container
- **Special Requirements** None
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 1-3 days
- **Stability** – 1 month at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** - Urine

	Gender	Reference Interval	Unit
Calcium random Urine	M/F	1.7-5.3	mmol/L
Calcium 24hr Urine	M/F	2.5-7.5	mmol/24hr

- **Notes/Limitations**
  Serum Calcium is included in the Bone Profile.
  Measurements of calcium in human serum, plasma and urine, are used in the diagnosis of hypercalcemia/hypercalciuria (such as observed in hyperparathyroidism and cancer, endocrine disorders, inherited hypercalcemia, excessive vitamin D intake, chronic kidney disease) and of hypocalcemia/hypocalciuria (such as observed in hypoparathyroidism, vitamin D or magnesium deficiency, calcium homeostasis bone disease). Calcium is the most abundant mineral element in the body with about 99% in the bones, primarily as hydroxyapatite. The remaining calcium is distributed between the various tissues and the extracellular fluids where it performs a vital role for many life sustaining processes. Among the extra skeletal functions of calcium are involvement in blood coagulation, neuromuscular conduction, excitability of skeletal and cardiac muscle, enzyme activation, and the preservation of cell membrane integrity and permeability. Urinary calcium results from glomerular filtration of albumin-free plasma calcium and intense calcium reabsorption along the different tubular segments. Serum calcium levels and hence the body content are controlled by parathyroid hormone (PTH), calcitonin, and vitamin D. An imbalance in any of these modulators leads to alterations of the body and serum calcium levels. Increases in serum PTH or vitamin D are usually associated with hypercalcemia. Increased serum calcium levels may also be observed in multiple myeloma and other neoplastic diseases. Hypocalcemia may be observed e.g. in hypoparathyroidism, nephrosis, and pancreatitis.

  Corrected calcium calculations are a reflection of the calcium that is free and available in the blood. The calculation is a calcium result adjusted to compensate for abnormally high or low levels of albumin in the blood which can cause the total calcium level to appear falsely high or low. Corrected calcium is automatically reported with all Calcium results.
  There is no significant interference from magnesium up to a concentration of 15mmol/L. No interference has been found using therapeutic concentrations using common drug panels. The interference of intravenously administered gadolinium containing MRI (magnetic resonance imaging) contrast media was tested (Omniscan, Optimark) but no interference has been found at therapeutic concentrations. Interferences at higher concentrations were observed. In rare cases, gammopathy, in particular IgM, may cause unreliable results. (Cobas Product Insert, Calcium Gen. 2. 2023-09, V9)
  24 hour urine containers may be obtained from Laboratory Reception.

Cholesterol

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** Consultant must phone in person if requested from Accident and Emergency department
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 3-5.2 mmol/L
- **Notes/Limitations**
  Cholesterol is included in the Lipid Profile
  Measurement of serum cholesterol is important in the diagnosis and classification of hyperlipoproteinaemias. Approximately three quarters of cholesterol is newly synthesized and one quarter originates from dietary intake. Cholesterol assays are used for screening for atherosclerotic risk and in the diagnosis and treatment of disorders involving elevated cholesterol levels as well as lipid and lipoprotein metabolic disorders. Elevated cholesterol levels may occur with hypothyroidism, nephrotic syndrome, diabetes, and various liver diseases. There is a correlation between elevated cholesterol levels and the incidence of coronary artery disease. Cholesterol level is affected by diet, age, gender, hormone balance, and pregnancy. Non-fasting samples yield slightly lower results than fasting samples. Depressed levels are associated with hyperthyroidism and severe liver disease.

  Drugs: No interference has been found at therapeutic concentrations using common drug panels. Acetaminophen intoxications are frequently treated with N-acetylcysteine. N-acetylcysteine at therapeutic concentration when used as an antidote and the acetaminophen metabolite N-acetyl-p-benzoquinone imine independently may cause falsely low results. Venipuncture should be performed prior to the administration of metamizole. Venipuncture immediately after or during the administration of metamizole may lead to falsely low results. In very rare cases, gammopathy, in particular type IgM (Waldenstrom's macroglobulinemia), may cause unreliable results. (Cobas Product Insert, Cholesterol Gen. 2. 2021-10, V 11)

Creatine Kinase (CK)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)**

Gender	Reference Interval	Units
M	0-190	U/L
F	0-170	U/L

- **Notes/Limitations**

  CK is found in heart, skeletal muscle, brain and red blood cells.
  Three cytoplasmic and one mitochondrial iso-enzymes occur:
  CK-MM (skeletal muscle and cardiac muscle);
  CK-BB (brain and GI smooth muscle);
  up to about 25% of cardiac muscle CK is CK-MB.
  CK varies with physical activity level and race in healthy individuals.

  Elevated total CK levels are found:
  - post surgery (for about a week);
  - muscular dystrophy;
  - some cases of head injury;
  - haemolysis (artefactual);
  - post myocardial infarction

  Post M.I.:
  CK is released from the damaged myocardial cells. CK will rise after 4- 6 hrs, peak at 12-24 hrs and fall to normal in 3-4 days;
  Myocardial damage is highly likely if:
  Total CK is > 190 U/l and the MB fraction >24 U/l and > 6%-25% of the total CK.

  Drugs: No interference has been found at therapeutic concentrations using common drug panels. Cyanokit (Hydroxocobalamin) can cause interference at therapeutic concentrations. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia) may cause unreliable results.
  (Cobas Product Insert, Creatine Kinase liquid according to IFCC. 2010-08, V 11)

Creatinine (CREAT)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** - None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service Users; 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range) Serum**

Serum	Gender	Reference Interval	Units
	M	62-106	mmol/L
	F	44-80	mmol/L
Pregnancy	F	40-80	mmol/L

- **Specimen –** Random urine/24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml with no additives.
  24 hour; 24hr urine collection container with no additives
- **Special Requirements -** A serum creatinine value is required for Creatinine Clearance calculations. Ensure that a recent serum sample (≤5days) has been sent to the laboratory for Creatinine quantification.
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 1-3 days
- **Stability** – 6 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range) Urine**

Test	Gender	Reference Interval	Units
Creatinine random urine	M/F	9-18	mmol/L
Creatinine random urine	M	9-21	mmol/24hr
Creatinine 24 hr urine collection	F	7-14	mmol/24hr
Creatinine Clearance 24 hr collection	M/F	75-151	ml/min

- **Notes/Limitations**
  Serum Creatinine is included in the Renal Profile. Urinary Creatinine is included in Protein Creatinine Ratio (PCR) /Estimated 24hr urinary Protein, Microalbumin Creatinine Ratio (MACR).
  Chronic kidney disease is a worldwide problem that carries a substantial risk for cardiovascular morbidity and death. Current guidelines define chronic kidney disease as kidney damage or glomerular filtration rate (GFR) less than 60 ml/min per 1.73m^2 for three months or more. The assay of creatinine in serum or plasma is the most commonly used test to assess renal function. Creatinine is a breakdown product of creatine phosphate in muscle, and is usually produced at a fairly constant rate by the body (depending on muscle mass). It is freely filtered by the glomeruli and, under normal conditions, is not reabsorbed by the tubules to any appreciable extent. A small but significant amount is also actively secreted. Since a rise in blood creatinine is observed only with marked damage of the nephrons, it is not suited to detect early stage kidney disease. A considerably more sensitive test and better estimation of glomerular filtration rate is given by the creatinine clearance test based on creatinine's concentration in urine and serum/plasma, and urine flow rate. For this test a precisely timed urine collection (24 hours) and a blood sample are needed. However, this test is prone to error due to the inconvenient collection of timed urine. Mathematical attempts to estimate GFR based on the serum/plasma creatinine concentration have been made.

  Creatinine serum
  Pyruvate: No significant interference from pyruvate up to a concentration of 0.3 mmol/l. Glucose: No significant interference from glucose up to a concentration of 25 mmol/l. Ascorbic acid: No significant interference from ascorbic acid up to a concentration of 5 mmol/l. Drugs: No interference was found at therapeutic concentrations using common drug panels. Exception: Antibiotics containing cephalosporin lead to significant false positive values. Exception: Cefoxitin causes artificially high creatinine results. Cyanokit (Hydroxocobalamin) may cause interference with results. The presence of ketone bodies can cause artificially high results in serum. In very rare cases, gammopathy, in

particular type IgM, may cause unreliable results. (Cobas Product Insert, Creatinine Jaffe Gen. 2. 2023-11 V 17).

Creatinine Urine
Glucose: No significant interference from glucose up to a concentration of 120mmol/l. Urea: No significant interference from urea up to a concentration of 2100mmol/l. Urobilinogen: No significant interference up to a concentration of 676µmol/l. Drugs: No significant interference was found at therapeutic concentrations using common drug panels. Exception: Cyanokit (Hydroxocobalamin) may cause interference with results. The presence of ketone bodies can cause artificially high results in urine. High homogentisic acid concentrations in urine samples lead to false results. (Cobas Product Insert, Creatinine Jaffe Gen. 2. 2023-11 V 17).

Creatinine Clearance (mls/min) = Urinary creatinine x Volume
Serum Creatinine /1440

A serum creatinine value is required for Creatinine Clearance calculations. Ensure that a recent serum sample (≤5 days) has been sent to the laboratory for Creatinine quantification.

C Reactive Protein (CRP)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 3 weeks at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 0-5 mg/dL
- **Notes/Limitations**
  C-reactive protein is the classic acute phase protein for inflammatory reactions. It is synthesised by the liver and consists of five identical polypeptideschains that form a five membered ring having a molecular weight of 105,000 daltons. CRP is the most sensitive of the acute phase reactants and its concentration increases rapidly during inflammatory processes. After onset of acute phase response CRP begins to increase within 6 to 12 hours and the peak value is reached within 24 to 48 hours. Complexed CRP activates the complement system. It then initiates opsonisation and phagocytosis of invading cells, but its main function is to bind and detoxify endogenous toxic substances produced as a result of tissue damage. CRP assays are used to detect systemic inflammatory processes (apart from certain types of inflammation such as SLE and Colitis ulcerosa) to assess treatment of bacterial infections with antibiotics; to detect intrauterine infections and concomitant premature amniorrhexis; to determine the presence of post-operative complications at an early stage, such as infected wounds, thrombosis and pneumonia, and to distinguish between infection and bone marrow transplant rejection. Levels above 100mg/l are associated with severe stimuli such as major trauma and severe infection (sepsis). CRP response may be less pronounced in patients suffering from liver disease. Persistence of a high serum CRP concentration is usually a grave prognostic sign which generally indicates the presence of an uncontrolled infection.

  No significant interference from Rheumatoid factors up to a concentration of 1200 IU/ml. No significant interference from immunoglobulins up to a concentration of 50g/l. A high dose Hook effect may occur at CRP concentrations > 1200 mg/l. No significant interference from Ticarcillin up to 225mg/L. Drug interferences are measured based on recommendations given in CLSI guidelines EP07 and EP37 and other published literature. Effects of concentrations exceeding these recommendations have not been characterized. Although measures were taken by the manufacturer of the assay to minimise interference caused by human anti-mouse antibodies, the possibility exists for interference by human anti-mouse antibodies (HAMA) in the sample which could cause falsely lowered results. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinaemia), may cause unreliable results. (Cobas Product Insert, C-Reactive Protein IV, 2023-09, V 4)

Drugs of Abuse (Urine)

- **Specimen –** Random urine
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml with no additives,
- **Special Requirements** None
- **Availability of assay – In-house patients Only; 24 hours.**
  For all other users; samples are sent to an external laboratory
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, SCBU, Day Ward); 4 hours
- **Stability -** 48 hours at 2^0C -8^0C
- **Biological Reference Interval (Reference range);** Positive/Negative
- **Notes/Limitations**

  Amphetamine (AMP): Amphetamine is a Schedule II controlled substance available by prescription (Dexedrine®) and is also available on the illicit market. Amphetamines are a class of potent sympathomimetic agents with therapeutic applications. They are chemically related to the human body's natural catecholamines: epinephrine and norepinephrine. Acute higher doses lead to enhanced stimulation of the central nervous system (CNS) and induce euphoria, alertness, reduced appetite, and a sense of increased energy and power. Cardiovascular responses to amphetamines include increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations, and psychotic behaviour. The effects of Amphetamines generally last 2-4 hours following use and the drug has a half-life of 4-24 hours in the body. About 30% of amphetamines are excreted in the urine in unchanged form, with the remainder as hydroxylated and deaminated derivatives.

  Barbiturates (BAR): Barbiturates are CNS depressants. They are used therapeutically as sedatives, hypnotics, and anticonvulsants barbiturates are almost always taken orally as capsules or tablets. The effects resemble those of intoxication with alcohol. Chronic use of barbiturates leads to tolerance and physical dependence. Short-acting barbiturates taken at 400 mg/day for 2-3 months can produce a clinically significant degree of physical dependence. Withdrawal symptoms experienced during periods of drug abstinence can be severe enough to cause death. Only a small amount (less than 5%) of most barbiturates are excreted unaltered in the urine. The approximate detection time limits for barbiturates are: Short acting (e.g. Secobarbital) 100 mg PO (oral) 4.5 days Long acting (e.g. Phenobarbital) 400 mg PO (oral) 7 days.

  Benzodiazepines (BZD): Benzodiazepines are medications that are frequently prescribed for the symptomatic treatment of anxiety and sleep disorders. They produce their effects via specific receptors involving a neurochemical called gamma aminobutyric acid (GABA). Because they are safer and more effective, benzodiazepines have replaced barbiturates in the treatment of both anxiety and insomnia. Benzodiazepines are also used as sedatives before some surgical and medical procedures, and for the treatment of seizure disorders and alcohol withdrawal. Risk of physical dependence increases if benzodiazepines are taken regularly (e.g., daily) for more than a few months, especially at higher than normal doses. Stopping abruptly can bring on such symptoms as trouble sleeping, gastrointestinal upset, feeling unwell, loss of appetite, sweating, trembling, weakness, anxiety and changes in perception. Only trace amounts (less than 1%) of most benzodiazepines are excreted unaltered in the urine; most of the concentration in urine is conjugated drug. The detection period for benzodiazepines in urine is 3-7 days.

  Cocaine (COC): Cocaine is a potent central nervous system stimulant and a local anesthetic. Initially, it brings about extreme energy and restlessness while gradually resulting in tremors, over-sensitivity and spasms. In large amounts, cocaine causes fever, unresponsiveness, difficulty in breathing and unconsciousness. Cocaine is often self-administered by nasal inhalation, intravenous injection and free-base smoking. It is excreted in the urine in a short time primarily as benzoylecgonine. Benzoylecgonine, a major metabolite of cocaine, has a longer biological half-life (5-8 hours) than cocaine (0.5-1.5 hours), and can generally be detected for 24-48 hours after cocaine exposure.

  Marijuana (THC): THC (Δ9-tetrahydrocannabinol) is the primary active ingredient in cannabis (marijuana). When smoked or orally administered, THC produces euphoric effects. Users have impaired short-term memory and slowed learning. They may also experience transient episodes of confusion and anxiety. Long-term, relatively heavy use may be associated with behavioural disorders. The peak effect of marijuana administered by smoking occurs in 20-30 minutes and the duration is 90-120 minutes after one cigarette. Elevated levels of urinary metabolites are found within hours of exposure and remain detectable for 3-10 days after smoking. The main metabolite excreted in the urine is 11-nor-D9- tetrahydrocannabinol-9-carboxylic acid (THC-COOH).

  Methadone (MTD): Methadone is a narcotic analgesic prescribed for the management of moderate to severe pain and for the treatment of opiate dependence (heroin, Vicodin, Percocet, morphine). The pharmacology of oral methadone is very different from IV methadone. Oral methadone is partially stored in the liver for later use. IV methadone acts more like heroin. In most states you must go to a pain clinic or a methadone maintenance clinic to be prescribed methadone. Methadone is a long acting pain reliever producing effects that last from twelve to forty-eight hours. Ideally, methadone frees the client from the pressures of obtaining illegal heroin, from the dangers of injection, and from the emotional roller coaster that most opiates produce. Methadone, if taken for long periods and at

large doses, can lead to a very long withdrawal period. The withdrawals from methadone are more prolonged and troublesome than those provoked by heroin cessation, yet the substitution and phased removal of methadone is an acceptable method of detoxification for patients and therapists.
Methamphetamine (MET) Methamphetamine is an addictive stimulant drug that strongly activates certain systems in the brain. Methamphetamine is closely related chemically to Amphetamine, but the central nervous system effects of Methamphetamine are greater. Methamphetamine is made in illegal laboratories and has a high potential for abuse and dependence. The drug can be taken orally, injected, or inhaled. Acute higher doses lead to enhanced stimulation of the central nervous system and induce euphoria, alertness, reduced appetite, and a sense of increased energy and power. Cardiovascular responses to Methamphetamine include increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations, psychotic behaviour, and eventually, depression and exhaustion. The effects of Methamphetamine generally last 2-4 hours and the drug have a half-life of 9-24 hours in the body. Methamphetamine is excreted in the urine primarily as Amphetamine, and oxidized and deaminated derivatives. However, 10-20% of Methamphetamine is excreted unchanged. Thus, the presence of the parent compound in the urine indicates Methamphetamine use. Methamphetamine is generally detectable in the urine for 3-5 days, depending on urine pH level.
Methylenedioxymethamphetamine (MDMA): Methylenedioxymethamphetamine (ecstasy) is a designer drug first synthesized in 1914 by a German drug company for the treatment of obesity. Those who take the drug frequently report adverse effects, such as increased muscle tension and sweating. MDMA is not clearly a stimulant, although it has, in common with amphetamine drugs, a capacity to increase blood pressure and heart rate. MDMA does produce some perceptual changes in the form of increased sensitivity to light, difficulty in focusing, and blurred vision in some users. Its mechanism of action is thought to be via release of the neurotransmitter serotonin. MDMA may also release dopamine, although the general opinion is that this is a secondary effect of the drug (Nichols and Oberlender, 1990). The most pervasive effect of MDMA, occurring in virtually all people who took a reasonable dose of the drug, was to produce a clenching of the jaws.
Morphine (MOR): Opiate refers to any drug that is derived from the opium poppy, including the natural products, morphine and codeine, and the semi-synthetic drugs such as heroin. Opioid is more general, referring to any drug that acts on the opioid receptor. Opioid analgesics comprise a large group of substances which control pain by depressing the CNS. Large doses of morphine can produce higher tolerance levels, physiological dependency in users, and may lead to substance abuse. Morphine is excreted unmetabolized, and is also the major metabolic product of codeine and heroin. Morphine is detectable in the urine for several days after an opiate dose.
Tricyclic Antidepressants (TCA): TCA (Tricyclic Antidepressants) are commonly used for the treatment of depressive disorders. TCA overdoses can result in profound CNS depression, cardiotoxicity and anticholinergic effects. TCA overdose is the most common cause of death from prescription drugs. TCAs are taken orally or sometimes by injection. TCAs are metabolized in the liver. Both TCAs and their metabolites are excreted in urine mostly in the form of metabolites for up to ten days.

Drugs Tested	**Cut off (ng/mL)**
Amphetamine	1000
Barbiturates	300
Benzodiazepines	300
Cocaine	300
Methamphetamine	1000
Morphine	1000
Methadone	300
MDMA	500
Tricyclic Antidepressants	1000
Marijuana	50

A negative result indicates that the drug concentration is below the detectable level. Positive result means the concentration of drug is above the detectable level.
No cross reactivity has been found using a variety of compounds when tested. If the patient takes a "cocktail" of several different drugs or medication cannot be excluded that a non-reproducible cross-reaction can falsified the test result. (Ultimed product insert. Drug Control Multi Drugcontrol MultiDIP 008SL410Feb. 2024, Rev G).

Drug of Abuse testing provides medically relevant diagnostic support/information to clinical teams to enable appropriate patient management. The Biochemistry Laboratory does not provide Chain of Custody sample processing and therefore Drugs of Abuse (Urine) are not used for legal purposes.

Estimated Glomerular Filtration Rate (eGFR)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability** (Serum Creatinine used for calculation) – 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**
  Relevant parties are requested to interpret all eGFR results by giving careful consideration to the prevailing clinical circumstances, as well as taking account of local Nephrology service referral protocols and international guidelines as appropriate.
- **Notes/Limitations**
  eGFR is included in the Adult Renal Profile
  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 such as diabetes, hypertension, cardiovascular disease or family history of kidney disease. Based on International guidelines the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI 2009) equation is used to calculate eGFR. It should be noted that the equation is only an estimate.

  The CKD-EPI is not validated for use in Pregnancy or Children (<18yrs). eGFR results should be interpreted with caution on people with extremes of muscle mass (bodybuilders, very muscular amputees, muscle wasting disorder, severely malnourished), on dialysis patients and people with Acute Kidney Injury. The patient's diet and nutrition status (recent intake of meat, high protein, creatinine supplements) should be taken into consideration. eGFR values near 'normal' should not be interpreted in isolation. The existing equations used for estimating eGFR may underestimate normal or near normal function around the 60ml/min/1.73m" CKD "cut-off" level. Do not rely on eGFR in patients with rapidly changing renal function. A decrease in eGFR values is caused by patients on Cimetidine, Fenofibrate and antibiotics. An increase in eGFR values is caused by large volume losses of extracellular fluid.

  It should be noted that the CKD-EPI eGFR equation is only an estimate of renal function. The CKD-EPI is not validated for use in Pregnancy or Children (<18yrs). eGFR results should be interpreted with caution on people with extremes of muscle mass (bodybuilders, very muscular amputees, muscle wasting disorder, severely malnourished), on dialysis patients and people with Acute Kidney Injury. The patient's diet and nutrition status (recent intake of meat, high protein, creatinine supplements) should be taken into consideration.
  eGFR values near 'normal' should not be interpreted in isolation. The existing equations used for estimating eGFR may underestimate normal or near normal function around the 60ml/min/1.73m" CKD "cut-off" level. Do not rely on eGFR in patients with rapidly changing renal function. A decrease in eGFR values is caused by patients on Cimetidine, Fenofibrate and antibiotics. An increase in eGFR values is caused by large volume losses of extracellular fluid.

  The laboratory does not provide eGFR results or manual eGFR calculations for children. If a clinician is looking for eGFR calculations on a child aged <16yrs, direct them to the use of the Schwartz equation. This is available online. For all other queries, refer the clinician to the Chief Medical Scientist Biochemisty and/or the Consultant Chemical Pathologist.

  eGFR (CKD-EPI Formula 2009) = $141 \times \min(S_{cr}/k,1)^{\alpha} \times \max(S_{cr}/k,1)^{-1.209} \times 0.993^{Age} \times 1.018$ [if female].

  where:
  S_{cr} is serum creatinine in µmol/l,
  k is 61.9 for females and 79.6 for males,
  α is -0.329 for females and -0.411 for males,
  min indicates the miniumum of S_{cr}/k or 1, and
  max indicates the maximum of S_{cr}/k or 1

  Do not use correction of eGFR based on race or ethnicity.

  Serum Creatinine measurement limitations used for eGFR calculations;

Pyruvate: No significant interference from pyruvate up to a concentration of 0.3 mmol/l. Glucose: No significant interference from glucose up to a concentration of 25 mmol/l. Ascorbic acid: No significant interference from ascorbic acid up to a concentration of 5 mmol/l. Drugs: No interference was found at therapeutic concentrations using common drug panels. Exception: Antibiotics containing cephalosporin lead to significant false positive values. Exception: Cefoxitin causes artificially high creatinine results. Cyanokit (Hydroxocobalamin) may cause interference with results. The presence of ketone bodies can cause artificially high results in serum. In very rare cases, gammopathy, in particular type IgM, may cause unreliable results. (Cobas Product Insert, Creatinine Jaffe Gen. 2. 2023-11 V 17).

eGFR results will be reported as a whole number if it is 90ml/min/1.73m^2 or less. eGFR results will be reported as >90ml/min/1.73m^2 if it is more than this value.

Electrolytes (Sodium Potassium Chloride)(Na^+, K^+, Cl^-)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** <1 day at 2^0C -8^0C
- **Biological Reference Interval (Reference range): Serum**

Serum	Age	Gender	Reference Interval	Units
Chloride		M/F	95-110	mmol/L
Potassium		M/F	3.5-5.1	mmol/L
Sodium	0-7 days	M/F	131-144	mmol/L
Sodium	8 days-1 month	M/F	132-142	mmol/L
Sodium	2-6 months	M/F	132-140	mmol/L
Sodium	7-12 months	M/F	131-140	mmol/L
Sodium	1-18years	M/F	132-141	mmol/L
Sodium	18-90 years	M/F	136-145	mmol/L
Sodium	>90 years	M/F	132-146	mmol/L
Sodium	Pregnancy	F	133-143	mmol/L

- **Specimen –** Random urine, 24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml no additives
  24 hour; 24hr urine collection container no additives
- **Special Requirements** None
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 1-2 days
- **Stability** – Urinary Sodium/Potassium; 14 days at 2^0C -8^0C
- **Availability of assay –** Monday-Friday excluding Bank Holiday
- **Biological Reference Interval(Reference range): Urine**

Urine	Age	Gender	Reference Interval	Units
Potassium Random	<40 years	M	11-80	mmol/L
Potassium Random	<40 years	F	17-145	mmol/L
Potassium Random	>40 years	M	17-99	mmol/L
Potassium Random	>40 years	F	22-164	mmol/L
Sodium Random	<40 years	M	25-301	mmol/L
Sodium Random	<40 years	F	15-267	mmol/L
Sodium Random	>40 years	M	18-214	mmol/L
Sodium Random	>40 years	F	15-237	mmol/L

- **Notes/Limitations**

Electrolytes are included in the Renal Profile
Electrolytes are involved in most major metabolic functions in the body. Sodium, potassium and chloride are amongst the most important physiological ions and the most often assayed electrolytes. They are supplied primarily through the diet, absorbed in the gastro-intestinal tract, and excreted via the kidneys.

Sodium is the major extracellular cation and functions to maintain fluid distribution and osmotic pressure. Some causes of decreased levels of sodium include prolonged vomiting or diarrhoea, diminished reabsorption in the kidney and excess fluid retention. Common causes of increased sodium include excessive fluid loss, high salt intake and increased kidney reabsorption.

Potassium is the major intracellular cation and is critical to neural and muscle cellular activity. Potassium measurements are used to monitor electrolyte balance in the diagnosis and treatment of

disease conditions characterized by low or high blood potassium levels: diuretic treatment, prolonged vomiting, diarrhoea, diabetes, renal dysfunction.

Chloride is the major extracellular anion and serves to regulate the balance of extracellular fluid distribution. Common causes of decreased chloride include reduced dietary intake, prolonged vomiting, some forms of acidosis and alkalosis and reduced renal absorption. Increased chloride values are found in dehydration, kidney failure, some forms of acidosis and salicylate poisoning.

Haemolysed samples are unsuitable for accurate measurement. Potassium concentration in erythrocytes is 25 times higher than in normal plasma. The level of interference may be variable depending on the exact content of the erythrocytes. Ensure that blood samples are taken in the correct order of draw. Failure to take blood samples using the correct order of draw will result Contamination during sample collection is more prevalent in blood collected in Paediatric sample tubes. This is due to the sample collection process. Observe all bottles for incorrect caps placed on sample tubes after sample collection.

Pseudohyponateremia may be seen with lipaemic-specimens as a result of fluid displacement. Sodium: Altered protein-/lipid levels may falsely shift sodium results into the opposite direction; i.e. elevated protein level=pseudohyponatremia, decreased protein level= pseudohypernatremia

The following drugs have been tested and caused no significant interference when added to aliquots of pooled normal human serum up to the indicated concentration. Falsely high chloride values have been reported from patients receiving perchlorate medication. This is due to an interference of perchlorate ions with chloride ISE determinations.

Serum panel:Acetaminophen (paracetamol)	200mg/l
Acetylcysteine	150mg/l
Acetylsalicylic acid	1000mg/l
Ampicillin-Na	1000mg/l
Ascorbic acid	300mg/l
Cefoxitin	2500mg/l
Cyclosporin	5mg/l
Doxycycline	50mg/l
Heparin	5000U
Ibuprofen	500mg/l
Intralipid	10000mg/l
L-Dopa	20mg/l
Methyldopa	20mg/l
Metronidazol	200mg/l
Phenylbutazone	400mg/l
Rifampicin	60mg/l
Theophylline	100mg/l
Urine panel: Acetaminophen (paracetamol)	3000mg/l
Acetylcysteine	10mg/l
Ascorbic acid	4000mg/l
Doxycyclin	300mg/l
Gentamycin sulphate	400mg/l
Ibuprofen	4000mg/l
L-Dopa	1000mg/l
Methyldopa	2000mg/l
Na-Cefoxitin	12000mg/l
Ofloxacine	900mg/l
Phenazopyridine	300mg/l
Salicylic acid	6000mg/l

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, ISE indirect Na-K-Cl for Gen. 2. 2022-12, V 9)

Ethanol (Alcohol)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability Unopened -** 2 weeks at 5^0C
- **Biological Reference Interval (Reference range)** 0-10mg/dL
- **Notes/Limitations**
  Ethanol is included in the serum Toxicology Profile
  Measurement is used in the diagnosis and treatment of alcohol intoxication and poisoning. The ethyl alcohol reagent used is specific for ethyl alcohol measurement only. Ethanol (Alcohol) testing provides medically relevant diagnostic support/information to clinical teams to enable appropriate patient management. The Biochemistry laboratory does not provide Chain of Custody sample processing and therefore Ethanol (Alcohol) is not used for legal purposes. Add on Ethanol requests on opened samples are not accepted. CAUTION: Do not use volatile solvents in the work area when performing assays. Do not perform sample preparation (especially spiking of pools) in the immediate work area. Vapor contamination of reagents can impact calibration stability. Add on requests for Alcohol on samples already tested is not permitted. Drugs: No interference has been found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. LDH/lactic acid (using a dose-response curve with purified LDH fractions added to a 30 mmol/L lactic acid solution): No significant interference up to 2000 U/L LDH. (Cobas Product Insert, Ethanol Gen. 2. 2022-06, V 11)

Iron (Fe^{+})

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
  Iron Studies; Routine hours Monday-Friday excluding Bank Holiday - 24 hours
- **Stability** - 3 weeks at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	8.1-28.6	mmol/L
>18 years	F	5.4-28.6	mmol/L
1-30 days	M	5.7-20.0	mmol/L
1-30 days	F	5.2-22.7	mmol/L
1 month-12 month	M	4.8-19.5	mmol/L
1 month-12 month	F	4.5-22.6	mmol/L
1-3 years	M	5.2-16.3	mmol/L
1-3 years	F	4.5-18.1	mmol/L
4-6 years	M	4.5-20.6	mmol/L
4-6 years	F	5.0-16.7	mmol/L
7-9 years	M	4.8-17.2	mmol/L
7-9 years	F	5.4-18.6	mmol/L
10-12 years	M	5.0-20.0	mmol/L
10-12 years	F	5.7-18.6	mmol/L
13-15 years	M	4.7-19.7	mmol/L
13-15 years	F	5.4-19.5	mmol/L
16-18 years	M	4.8-24.7	mmol/L
16-18 years	F	5.9-18.3	mmol/L

- **Notes/Limitations**
  Iron is included in the Iron Studies Profile.
  Ingested iron is mainly absorbed in the form of Fe^{2+} in the duodenum and upper jejunum. The trivalent form and the heme-bound Fe^{3+} component of iron in food has to be reduced by vitamin C. About 1 mg of iron is assimilated daily. Upon reaching the mucosal cells, Fe^{2+} ions become bound to transport substances. Before passing into the plasma, these are oxidized by ceruloplasmin to Fe^{3+} and bound to transferrin in this form. The transport of Fe ions in blood plasma takes place via transferrin-iron complexes. A maximum of 2 Fe^{3+} ions per protein molecule can be transported. Serum iron is almost completely bound to transferrin. Iron (non-heme) measurements are used in the diagnosis and treatment of diseases such as iron deficiency anemia, hemochromatosis (a disease associated with widespread deposit in the tissue of the two iron-containing pigments, hemosiderin and hemofuscin, and characterized by pigmentation of the skin), and chronic renal disease. Iron determinations are performed for the diagnosis and monitoring of microcytic anemia (e.g. due to iron metabolism disorders and hemoglobinopathy), macrocytic anemia (e.g. due to vitamin B12-deficiency, folic acid deficiency and drug-induced metabolic disorders of unknown origin) as well as normocytic anemias such as renal anemia (erythropoetin deficiency), hemolytic anemia, hemoglobinopathy, bone marrow disease and toxic bone marrow damage.

  Drugs: No interference was found at therapeutic concentrations using common drug panels. In patients treated with iron supplements or metal-binding drugs, the drug-bound iron may not properly react in the test, resulting in artificially low values. In the presence of high ferritin concentrations > 1200 µg/L the assumption that serum iron is almost completely bound to transferrin is not valid anymore. Therefore, such iron results should not be used to calculate Total Iron Binding Capacity (TIBC) or percent transferrin saturation (% SAT). In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Iron Gen. 2. 2022-05, V 12)

Glucose

- **Specimen –** Blood
- **Volume –** Adult; 2.7ml, Paediatric; 1.2ml
- **Sample/Container –** Fluoride EDTA FE
- **Colour Code -** Yellow
- **Special Requirements** Patient must be fasting from Midnight for a minimum of 8 hours prior to sample taken for fasting Glucose. Refer to Specialist Diabetes/Obstetrics departments for further advice and information.
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** Fluoride Oxalate; 3 days 4-8^{0}C
  Serum; <4 hours 15^{0}C -25^{0}C
- **Biological Reference Interval (Reference range):** Plasma

Test	Gender	Reference Interval	Units
Glucose (Fasting)	M/F	3.5-5.6	mmol/L
Glucose (Random)	M/F	3.5-7.8	mmol/L
Glucose (1hr,2hr,3hr)	M/F	3.5-7.8	mmol/L
Glucose Gestational Fasting	F	3.5-5.1	mmol/L
Glucose Gestational 1hr	F	3.5-10.0	mmol/L
Glucose Gestational 2 hr	F	3.5-8.5	mmol/L

- **Specimen –** CSF
- **Volume –** 1ml
- **Sample/Container –** CSF sterile container
- **Colour Code -** White
- **Special Requirements** Phone the Medical Scientist On-Call at *51769 when sending CSF samples. Do Not send CSF samples through the Pneumatic tube system. Hand deliver to laboratory Only
- **Availability of assay –** In-house patients; 24 hours.
- **Turnaround time –** 75 minutes
- **Stability -** Must be assayed immediately
- **Biological Reference Interval (Reference range):** CSF

Test	Age	Gender	Reference Interval	Units
Glucose CSF	>18 years	M/F	2.22-3.89	mmol/L
Glucose CSF	<18 years	M/F	3.33-4.44	mmol/L

- **Notes/Limitations**
  Glucose is the major carbohydrate present in the peripheral blood. Oxidation of glucose is the major source of cellular energy in the body. Glucose derived from dietary sources is converted to glycogen for storage in the liver or to fatty acids for storage in adipose tissue. The concentration of glucose in blood is controlled within narrow limits by many hormones, the most important of which are produced by the pancreas. The most frequent cause of hyperglycaemia is diabetes mellitus resulting from a deficiency in insulin secretion or action. A number of secondary factors also contribute to elevated blood glucose levels. These include pancreatitis, thyroid dysfunction, renal failure and liver disease. Hypoglycaemia is less frequently observed. A variety of conditions may cause low blood glucose levels such as insulinoma, hypopituitarism or insulin induced hypoglycaemia. Glucose measurement in cerebrospinal fluid is used for evaluation of meningitis, neoplastic involvement of meninges and other neurological disorders.

  Measurement is used in:
  - diagnosis and monitoring of diabetes mellitus
  - diagnosis and monitoring of gestational diabetes
  - neonatal hypoglycaemia
  - idiopathic hypoglycaemia; alcohol induced hypoglycaemia
  - pancreatic islet cell carcinoma.

  Abnormally low CSF Glucose can indicate
  - Bacterial/Fungal infection
  - Inflammation of Central nervous system
  - Tumour
  - Chemical meningitis
  - Subarachnoid Haemorrhage
  - Hypoglycaemia

In healthy individuals, the ratio of simultaneously determined plasma to CSF glucose is ≥60%.

During On-Call hours, the Medical Scientist MUST be called when CSF samples are sent to the laboratory for Glucose testing. This is to ensure that there are no unnecessary delays in analysis in the interests of patient safety.

It is Prohibited to send CSF samples through the hospital Pneumatic Shute system. This is to avoid potential delays due to Shute system breakdown or the samples sent to the incorrect location. Send samples via a porter or in person to the laboratory for analysis.

No interference has been found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM may cause unreliable results. (Cobas Product Insert, Glucose HK Gen. 3. 2022-03, V11)

Gamma Glutamyltransferase (GGT)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability** - 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	8-61	U/L
>18 years	F	5-36	U/L
0-1 day	M/F	3-151	U/L
2-5 days	M/F	3-185	U/L
6 days-6 months	M/F	3-204	U/L
7-12 months	M/F	3-34	U/L
1-3 years	M/F	3-18	U/L
4-6 years	M/F	3-23	U/L
7-12 years	M/F	3-17	U/L
13-17 years	M	3-45	U/L
13-17 years	F	3-33	U/L

- **Notes/Limitations**
  GGT is included in the Liver Profile
  γ-glutamyltransferase is used in the diagnosis and monitoring of hepatobiliary diseases. Enzymatic activity of GGT is often the only parameter with increased value when testing for such diseases, and is one of the most sensitive indicators known. γ-glutamyltransferase is also a sensitive screening test for occult alcoholism. Elevated GGT activities are found in the serum of patients requiring long-term medication with phenobarbital and phenytoin.

  Drugs: No interference was found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM may cause unreliable results. (Cobas Product Insert Gamma Glutamyltransferase Ver. 2. 2024-08, V 9).

Gentamicin

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** - Refer to MRHP medicines app/Consultant Microbiologist/Antimicrobial Pharmacist for dosing regimen.
  Pre Gentamicin=Trough, Post Gentamicin=Peak
- **Availability of assay –** In-house patients; 24 hours,
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 1 week capped at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Test		Gender	Reference Interval	Units
Gentamicin	Peak (Post)	M/F	5-8	mg/L
Gentamicin	Trough (Pre)	M/F	0-1	mg/L

- **Notes/Limitations**
  Gentamicin measurements performed with this assay, in human serum and plasma, are used for monitoring gentamicin treatment to ensure appropriate therapy. Gentamicin is an aminoglycoside antibiotic extracted from Micromonospora purpurea which is effective against a wide range of bacteria including most gram-negative bacteria and staphylococci. It is indicated in serious infections such as bacteraemia, urinary tract infections, chest infections, severe neonatal infections and other serious systemic infections due to susceptible organisms, in adults and children including neonates. The bactericidal action of gentamicin is due to its ability to bind the 30S subunit proteins of the bacterial ribosomes, thereby inhibiting protein synthesis and acting in both the proliferation and resting phases of bacteria. The drug is mainly excreted by glomerular filtration and has a half life ranging from 2 to 3 hours. Overexposure to gentamicin has been associated with nephrotoxicity and ototoxicity, especially in patients with pre-existing renal damage, in paediatric, elderly and critically ill patients. Therefore, serum concentration monitoring of gentamicin is recommended, especially in elderly, in newborns and in patients with impaired renal function in order to reduce the risk of serious complications and for adjustment of dosage administration as indicated.

  Refer to the MRHP Medicines App/hospital Consultant Microbiologist/Antimicrobial Pharmacist for guidance on dosing regimens. It is important that the date and time sample taken is clearly indicated on the sample and request form. This information will be provided on the laboratory report and is important for clinical interpretation. Also, clearly indicate if the sample is Pre/Trough Gentamicin or Post/Peak Gentamicin. Expected values reflect the data and information provided in the reference and do not necessarily represent therapeutic recommendations and/or dosage instructions. For therapeutic recommendations and dosage instructions refer to applicable guidelines and the full prescription information of the drug.

  Rheumatoid factors; No significant interference from rheumatoid factors up to a concentration of 100 IU/mL. Total protein; No significant interference from total protein up to a concentration of 12 g/dL.

  Note: A negative bias of up to approximately 20 % has been observed with this assay for some samples artificially spiked with Gentamicin sulfate. Patient samples have been verified to recover correctly.

  In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. In very rare cases, patient samples may contain particle agglutinating proteins (e.g. heterophilic antibodies or antibodies due to abnormal immunoglobulin synthesis, such as gammopathies like MGUS) or Waldenström's macroglobulinemia), which may lead to incorrect low or high results with this assay. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, GENT2. Online TDM Gentamicin. 2023-12, V 9)

Human Chorionic Gonadotropin and β subunit (Total hCG) (hCG+β)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml.
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** A Consultant Obstetrician Must phone the Medical Scientist On-Call at *51769 if testing is required outside of routine hours. Communication will be documented on the patient report.
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** In-house Urgent; ≤3 hours
  In-house Routine; 7 hours
  External Service users; 24 hours
- **Stability -** 3 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Gender	Reference Interval	Units
F	0.1-5.3	U/L

- **Notes/Limitations**

Similarly to LH, FSH and TSH, human chorionic gonadotropin (hCG) is a member of the glycoprotein family and consists of 2 subunits (α- and β-chains) which are associated to the intact hormone. The α-chains in all four of these glycoprotein hormones are virtually identical, whereas the β-chains have greatly differing structures and are responsible for the respective specific hormonal functions. HCG is produced in the placenta during pregnancy. In non-pregnant women, it can also be produced by tumors of the trophoblast, germ cell tumors with trophoblastic components and some non-trophoblastic tumors. Human chorionic gonadotropin consists of a number of isohormones with differing molecular size. The biological action of hCG serves to maintain the corpus luteum during pregnancy. It also influences steroid production. The serum of pregnant women contains mainly intact hCG. Elevated values here serve as an indication of chorionic carcinoma, hydatiform mole or multiple pregnancy. Depressed values indicate threatening or missed abortion, ectopic pregnancy, gestosis or intra-uterine death. Measurement of hCG+β makes also a contribution to the risk assessment for trisomy 21 (Down syndrome) in the second trimester of pregnancy together with AFP and other parameters, such as exact gestational age and maternal weight. HCG measurements for tumour investigation is carried out in Biochemistry Midlands Regional Hospital Tullamore.

Serum quantitative hCG testing is carried out during routine laboratory hours (Mon-Fri Excluding Bank Holiday). The request to analyse serum HCG out of hours/On-Call hours MUST be made In Person by the Consultant Obstetrician reviewing the patient, to the Medical Scientist On-Call.

Serum quantitative hCG testing in Biochemistry MRH at Portlaoise is used for the investigation of pregnancy and pregnancy related conditions only. Refer hCG for the investigation of Tumours to Biochemistry MRH at Tullamore.

The measured hCG value of a patient's sample can vary depending on the testing procedure used. hCG values determined on patient samples by different testing procedures cannot be directly compared with one another and could be the cause of erroneous medical interpretations. If there is a change in the hCG assay procedure used while monitoring therapy, then the hCG values obtained upon changing over to the new procedure must be confirmed by parallel measurements with both methods.

For In patients receiving therapy with high biotin doses (i.e. > 5 mg/day), no sample should be taken until at least 8 hours after the last biotin administration.
No interference has been observed from rheumatoid factors up to a concentration of 3400 IU/mL and samples from dialysis patients. There is no high-dose hook effect at hCG concentrations up to 750000 IU/L. In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Intact Human Chorioic Gonadotropin + the β subunit. 2020-11, V 19)

HDL-Cholesterol (HDL)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** Consultant must phone in person if requested from Accident and Emergency department
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Gender	Reference Interval	Unit
M	1.45-4	mmol/L
F	1.68-4	mmol/L

- **Notes/Limitations**
  HDL Cholesterol is included in the Lipid Profile
  High density lipoproteins (HDL) are responsible for the reverse transport of cholesterol from the peripheral cells to the liver. Here the cholesterol is transformed to bile acids whish are excreted into the intestine via the biliary tract. Monitoring of HDL levels in serum is of importance since there is an inverse relationship between the HDL level and the risk of atherosclerotic disease. Elevated HDL levels are protective against coronary artery disease, while reduced levels in conjunction with high triglyceride increases the risk.

  Ascorbic acid up to 2.84 mmol/l does not interfere. Elevated concentrations of free fatty acids and denatured proteins may cause falsely elevated HDL-cholesterol results. Abnormal liver function affects lipid metabolism; consequently, HDL and LDL results are of limited diagnostic value. In some patients with abnormal liver function, the HDL-C plus result is significantly negatively biased versus the DCM (designated comparison method) result due to the presence of lipoproteins with abnormal lipid distribution. No interference has been found at therapeutic concentrations using common drug panels.
  Statins (Simvaststin) and fibrates (Bezafibrate) tested at therapeutic concentrations have been found not to interfere. N-acetylcysteine: No significant interference fron N-acetylcysteine up to a concentration of 2.76 mmol/L. Acetaminophen intoxications are frequently treated with N-acetylcysteine. N-acetylcysteine at therapeutic concentration when used as an antidoteand the acetaminophen metabolite N-acetyl-p-benzoquinone imine independently may cause falsely low HDL-cholesterol results. Metamizole: Venipuncture should be performed prior to the administration of metamizole. Venipuncture immediately after or during the administration of metamizole may lead to falsely low results. In very rare cases, gammopathy, in particular type IgM (Waldenstrom's macroglobulinemia), may cause unreliable results. (Cobas Product Insert, HDL-C Plus 3rd Generation. 2010-05, V 4)

Lactate

- **Specimen –** Blood
- **Volume –** Adult; 2.7ml, Paediatric; 1.2ml
- **Sample/Container –** Fluoride EDTA FE Sarstedt Monovette
- **Colour Code -** Yellow
- **Special Requirements -** Lactate is a labile test. Sample stability is ≤15minutes between sample phlebotomy and centrifugation. Sample Collection Must be documented on the request form and sample. Phone Biochemistry 96267 routine hours, *51769 On-Call hours prior to sending Lactate Requests.
  Lactate is available on several Blood Gas analysers throughout the hospital
- **Availability of assay –** In-house patients Only; 24 hours.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability - ≤15minutes between sample phlebotomy and centrifugation**
  Plasma separated; 8 hours at 15^0C -25 ^{0}C
- **Biological Reference Interval (Reference range)** 0.5-2.2 mmol/L

- **Notes/Limitations**
  Anaerobic glycolysis markedly increases blood lactate and causes some increase in pyruvate levels, especially with prolonged exercise. The common cause for increased blood lactate and pyruvate is anoxia resulting from such conditions as shock, pneumonia and congestive heart failure. Lactic acidosis may also occur in renal failure and leukemia. Thiamine deficiency and diabetic ketoacidosis are associated with increased levels of lactate and pyruvate. Lactate measurements that evaluate the acid-base status are used in the diagnosis and treatment of lactic acidosis (abnormally high acidity in the blood).

  Fluoride Oxalate sample is required for Lactate. Lactate is a labile analyte. Samples/forms MUST have the time the sample was taken indicated. The laboratory MUST be phoned when sending Lactate requests to the laboratory. Samples >15 minutes old will be rejected. As an alternative, Lactate is available on several Point of Care Blood Gas analysers throughout the hospital.

  Drugs: No interference was found at therapeutic concentrations using common drug panels. N-Acetylcysteine at a plasma concentration above 1497mg/L and the Acetaminophen metabolite N-acetly-p-benzoquinone imine independently may cause falsely low results. Venipuncutre should be performed prior to the administration of Metamizole. Venepuncture immediately after or during the administration of Metamizole may lead to falsely low results. A significant interference may occur at any plasma Metamizole concentration Calcium dobesilate causes artificially low Lactate results. Glycolate, a metabolite of ethylene glycol, causes a positive interference which is variable from lot to lot of reagent. Dicynone (Etamsylate) at therapeutic concentrations may lead to falsely low results. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Lacatat Gen. 2. 2023-09 V11

Lactate Dehydrogenase (LDH)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements**
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 15^0C -25^0C
  Refrigerated samples are unsuitable for accurate LDH analysis
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M	135-225	U/L
>18 years	F	135-214	U/L
0-1 year	M/F	10-451	U/L
1 -3 years	M/F	10-344	U/L
4-6 years	M/F	10-314	U/L
7-12 years	M/F	10-332	U/L
13-17 years	M/F	10-279	U/L

- **Notes/Limitations –**
  LDH is widely distributed in tissue, particularly heart, liver, muscle and kidney. LDH in serum can be separated into five different isoenzymes, LDH-1 found in heart and LDH-5 in muscle. Elevated levels are found in a variety of diseases. The highest levels are associated with megaloblastic anaemia, leukaemia, disseminated carcinoma, myocardial infarction and trauma. High levels are found in acute viral hepatitis, cirrhosis and metastatic carcinoma of the liver. Mild increases are found in haemolytic anaemia, muscular dystrophy and nephrotic syndrome. Refrigerated samples are unsuitable for accurate LDH analysis

  In very rare cases, gammopathy, in particulary IgM, may cause unreliable results. (Cobas Product Insert, Lactate Dehydrogenase acc. to IFCC ver. 2. 2022-03, V 8)

LDL-Cholesterol (LDL)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** - Consultant must phone in person if requested from Accident and Emergency department
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 0-2.59 mmol/L
- **Notes/Limitations**
  LDL Cholesterol is included in the Lipid Profile
  Low density lipoproteins play a key role in causing and influencing the progression of atherosclerosis and coronary artery disease. The LDLs are eliminated from plasma mainly by the liver parenchymal cells via specific LDL receptors. Elevated LDLs in blood and/or an increase in their residence time along with oxidation modification, results in destruction of the endothelial cells and an increase in uptake of the modified LDL by macrophages and smooth muscle cells in blood vessel walls. This ultimately leads to plaque formation. The LDL value is the most powerful clinical predictor with respect to coronary atherosclerosis. Therefore therapies focusing on lipid reduction primarily target the reduction of LDL levels, resulting in an improvement in endothelial function, reducing progression of atherosclerosis and prevention of plaque rupture.

  Ascorbic acid up to 28.4mmol/l does not interfere. No significant interference from HDL-C (≤3.03 mmol/L), VLDL, or chylomicrons (≤22.6mmol/L Triglycerides). In rare cases elevated immunoglobulin concentrations can lead to falsely elevated LDL-cholesterol results. Abnormal liver function affects lipid metabolism; consequently HDL and LDL results are of limited diagnostic value. In some patients with abnormal liver function, the LDL-C plus result is significantly negatively biased versus beta quantification results.

  Acetaminophen intoxications are frequently treated with N-acetylcysteine.
  N-acetylcysteine at the therapeutic concentration when used as an antidote and the acetamijophen metabolite N-acetyl-p-benzoquinone imine (NAPQ) independently may cause flasly low LDL-C results. Venipuncture should be performed prior to the administration of metamizole. Venipuncture immediately after or during the administration of metamizole may lead to falsely low results.
  In very rare cases, gammopathy, in particulary IgM, may cause unreliable results. (Cobas Product Insert, LDL-Cholesterol Gen. 3. 2022-04, V 5)

Lithium (Li)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 0.6-1.2 mmol/L
- **Notes/Limitations**
  Lithium measurements, performed with this assay in human serum are used in monitoring lithium levels to ensure appropriate therapy. Lithium is a monovalent cation administered in oral formulations as carbonate or citrate salt. It is a mood-stabilizing agent indicated to treat manic episodes, bipolar disorder and is also useful as an adjunct for refractory depression and to control aggressive behaviour or intentional self-harm. The precise mechanism of action of lithium as a mood-stabilizing agent remains unknown, although many cellular actions of lithium have been characterized. It is believed that lithium can modulate several neurochemical systems, through ion channels, neurotransmitters (serotonin, dopamine and norepinephrine) and second messengers such as phosphoinositides and cyclic AMP (cAMP). It has been found to also influence brain glycogen synthase kinase 3β (GSK3-β), an enzyme that appears critical in the action of dopamine and serotonin in affecting behaviour. A major cause of relapse for bipolar disorder patients is often nonadherence to the treatment. Serum lithium concentrations are measured essentially to ensure treatment adherence and to avoid toxicity. Since toxic serum concentrations of lithium are closely related to therapeutic serum lithium concentrations, clinicians are advised to ensure that facilities are available for rapid and accurate assessment of lithium concentrations when considering treatment. Some patients may be abnormally sensitive to lithium and exhibit toxic signs at concentrations within the therapeutic range. Patients should be monitored for signs and symptoms of lithium toxicity, including renal and thyroid toxicity, throughout treatment. Early symptoms of intoxication include apathy, sluggishness, drowsiness, lethargy, speech difficulties, irregular tremors, myoclonic twitchings, muscle weakness and ataxia. Lithium is cleared through the kidneys, therefore reduced renal function can prolong clearance time and elderly patients as well as patients with renal impairment may have increased elimination half-life. Lithium levels must be closely monitored in patients with mild and moderate renal insufficiency and the dose adjusted accordingly. In the diagnostic laboratory, lithium has traditionally been measured using either flame emission photometry, atomic absorption spectrometry, or ion selective electrodes. These methods require specific and often dedicated instrumentation.

  Drugs: No interference was found at therapeutic concentrations using common drug panels. In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, LI. 2024-02, V 7)

Magnesium (Mg)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability** - 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
0-4 months	M/F	0.62-0.91	mmol/L
5 months-6 years	M/F	0.70-0.95	mmol/L
6-12 years	M/F	0.70-0.86	mmol/L
12-20 years	M/F	0.70-0.91	mmol/L
20-60 years	M/F	0.66-1.07	mmol/L
60-90 years	M/F	0.66-0.99	mmol/L
>90 years	M/F	0.70-0.95	mmol/L

- **Notes/Limitations**
  Magnesium is included in the Bone Profile
  Magnesium is the fourth most abundant cation in the body, with about 50 – 60% present in the bone in association with calcium and phosphate. Much of the remaining magnesium is intracellular and only a small amount is found in extracellular fluid. Magnesium functions as an activator for various physiochemical functions including phosphorylation, protein synthesis, and DNA metabolism. It is also involved in neuromuscular conduction and excitability of skeletal and cardiac muscle. Magnesium is absorbed in the intestine in an inversely related amount to that of intake. The kidneys control magnesium homeostasis through tubular reabsorption allowing for conservation or excretion as required. Increased serum magnesium occurs in renal failure, acute diabetic acidosis, dehydration, or Addison's disease. Hypermagnesemia has a depressing effect on the central nervous system, causing general anesthesia and respiratory failure. It alters the conduction mechanism of the heart, causing cardiac arrest. Hypomagnesemia may be observed in chronic alcoholism, malabsorption, severe diarrhoea, acute pancreatitis, diuretic therapy, prolonged parenteral fluid therapy without magnesium supplementation, and kidney disorders. Decreased magnesium levels may give rise to tetany, convulsions, and cardiac arrhythmias.

  Drugs: No interference has been found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia, may cause unreliable results. (Cobas Product Insert, MG2, Magnesium Gen. 2. 2010-12, V 16)

Nt pro-BNP

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml.
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house/OPD patients (excluding patients attending Accident and Emergency)
  Routine hours Monday-Friday excluding Bank Holiday. Batched Test.
  External service users; Consultant request Only. Attach consultant's correspondence to request form.
- **Turnaround time –** 1-2 days
- **Stability** - 6 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
0-50 years	M/F	300-450	pg/ml
50-75 years	M/F	300-900	pg/ml
>75 years	M/F	300-1800	pg/ml

- **Notes/Limitations**
  The Cobas proBNP II assay is indicated as an aid in the diagnosis of individuals suspected of having congestive heart failure and detection of mild forms of cardiac dysfunction. The test also aids in the assessment of heart failure severity in patients diagnosed with congestive heart failure. The Elecsys proBNP II assay is further indicated for the risk stratification of patients with acute coronary syndrome and congestive heart failure, and it can also be used for monitoring the treatment in patients with left ventricular dysfunction. This test can help in the cardiovascular risk assessment of patients with type 2 diabetes mellitus. The test is further indicated to aid in the identification of patients at risk with type 2 diabetes mellitus, without known history of cardiovascular disease, to optimize cardioprotective treatment. This test can be used to identify elderly individuals at high-risk for atrial fibrillation. The significance of natriuretic peptides in the control of cardiovascular system function has been demonstrated. The following natriuretic peptides have been described: atrial natriuretic peptide (ANP), B-type natriuretic peptide (BNP) and C-type natriuretic peptide (CNP). ANP and BNP, as antagonists of the renin-angiotension-aldosterone system, influence by means of their natriuretic and diuretic properties, the electrolyte and fluid balance in an organism. Heart failure (HF) is a clinical syndrome characterized by systemic perfusion inadequate to meet the body's metabolic demands as a result of structural and/or functional cardiac abnormality, resulting in reduced cardiac output and/or elevated intracardiac pressures at rest or during stress. Left ventricular dysfunction can be one of the functional precursors of HF. In subjects with left ventricular dysfunction, serum and plasma concentrations of BNP increase as does the concentration of the putatively inactive amino-terminal fragment, NT-proBNP. Several studies have demonstrated the significant role of natriuretic peptide testing, including NT-proBNP, in HF management from diagnosis to monitoring, leading to the recommendation to use them in clinical practice by major international guidelines with often highest level of evidence and recommendation. The European Society of Cardiology HF Guidelines recommends natriuretic peptides, including NT-proBNP, as an initial diagnostic test. Patients with NT-proBNP below the recommended NT-proBNP cutoffs for non-acute and acute onsets are unlikely to have HF, and therefore do not require echocardiography and elevated NT-proBNP levels help to identify patients who require further cardiac investigation. This test is also useful in the early stages of HF, where symptoms may be transient rather than present all the time. The high sensitivity of NT-proBNP allows the detection of mild forms of cardiac dysfunction in asymptomatic patients with structural heart disease. In chronic heart failure (CHF), serial measurement of NT-proBNP concentration can be used to monitor the disease progression, to predict outcomes and evaluate the success of treatment. Elevated NT-proBNP values are strongly predictive of adverse outcomes and rising values identify a risk, while significant lowering of NT-proBNP denotes improved outcomes and better prognosis. This test can be used to identify individuals at high-risk for atrial fibrillation.

  Nt pro-BNP testing is available to MRH at Portlaoise In-house and OPD patients (excluding A/E). All other test requests; is available by arrangement only and must be authorized by a hospital Consultant. Attach the consultant's correspondence, requesting the test, to the request form.

  Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

  Rheumatoid factors ≤1500 IU/mL.

  IgG ≤6.0g/dl

IgA ≤1.6g/dl

IgM ≤1.0g/dl

There is no high-dose hook effect at NT-proBNP concentrations up to 33400 pmol/L (300000 pg/mL).

51 commonly used pharmaceuticals were tested, no interference was found.

In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design. In extremely rare cases, patients may show discrepant results when tested with the assay kit (values < lower detection limit) due to a NT-proBNP genetic variant. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Elecsys proBNPII. 2024-01 V 3)

Phosphorous (Inorganic) (Phos)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 4 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range) Serum**

Age	Gender	Reference Interval	Units
>18 years	M/F	0.81-1.45	mmol/L
0-4 days	M/F	1.5-2.6	mmol/L
5 days-3years	M/F	1.2-2.1	mmol/L
3-10 years	M/F	1.2-1.8	mmol/L
10-15 years	M/F	1.1-1.75	mmol/L

- **Specimen –** Random urine/24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml with no additives.
  24 hour; 24hr urine collection container with no additives
- **Special Requirements** - Store cooled during 24 hr urine collection
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 1-3 days
- **Stability -** 6 months at 4^0C -8^0C (when acidified)

Test	Gender	Reference Interval	Unit
Phosphate Random urine	M/F	8.6-28	mmol/L
Phosphate 24hr urine	M/F	12.9-42	mmol/24hr

- **Notes/Limitations**

  Serum Phosphorous is included in the Bone Profile
  The majority (85%) of the body phosphorous is located in the bone in the form of calcium phosphate. The remainder is involved in intermediary carbohydrate metabolism and in substances such as phospholipids and ATP. Calcium and phosphate in the blood form a reciprocal relationship, with an increase in one leading to a decrease in the other. The ratio of phosphate to calcium in the blood is approximately 6 : 10. An increase in the level of phosphate causes a decrease in the calcium level. The mechanism is influenced by interactions between parathormone and vitamin D. Hyperphosphatemia originates from excessive phosphate intake or renal reabsorption, reduced phosphate excretion or transcellular shifting. Clinical conditions such as hypoparathyroidism, vitamin D intoxication and most commonly, renal failure with decreased glomerular phosphate filtration (like in chronic kidney disease, CKD), give rise to hyperphosphatemia. Hypophosphatemia is the result of inadequate phosphorus intake, reduced intestinal absorption, excessive urinary excretion, or redistribution of phosphate to the intracellular compartments. Clinical conditions such as rickets, hyperparathyroidism and Fanconi's syndrome are associated with hypophosphatemia. The method presented here for the determination of inorganic phosphate is based on the reaction of phosphate with ammonium molybdate to form ammonium phosphomolybdate without reduction.

  Drugs: No interference was found at therapeutic concentrations using common drug panels with the exception of phospholipids contained in liposomal drug formulations (e.g. AmBisome) may be hydrolysed in the test due to the acidic reaction ph and thus lead to elevated phosphate results.

  Urines: No interference was found at therapeutic levels using common drug panels. Urea: No significant interference from urea up to a concentration of 1500mmol/L. (Cobas Product Insert, Phosphate (Inorganic) Ver. 2. 2023-10, V 14)

  24 hour urine containers may be obtained from Laboratory Reception.

Rheumatoid Factor (Rf)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** Monday-Friday routine hours excluding Bank Holiday
- **Turnaround time –** 24 hours
- **Stability -** 8 days at 4^0C -8^0C
- **Biological Reference Interval (Reference range)** 0-14 IU/ml
- **Notes/Limitations**
  Rheumatoid factors are a heterogeneous group of autoantibodies directed against the antigenic determinants on the Fc-region of IgG molecules. They are important in the diagnosis of rheumatoid arthritis but can be found in other inflammatory rheumatic diseases and in various non-rheumatic diseases. They are also found in clinically healthy persons over 60 years of age. Despite these restrictions, the detection of rheumatoid factors is a diagnostic criterion of the American College of Rheumatology for classifying rheumatoid arthritis. The autoantibodies occur in all the immunoglobulin classes, although the usual analytical methods are limited to the detection of rheumatoid factors of the IgM type. The classic procedure for the quantitation of rheumatoid factors is by agglutination with IgG-sensitized sheep erythrocytes or latex particles. Particular problems with these semiquantitative methods are the poor between-laboratory precision and reproducibility, together with standardization difficulties. For these reasons, new assay methods such as nephelometry, turbidimetry, enzyme-immunoassays and radioimmunoassays have been developed. The Roche RF assay is based on the immunological agglutination principle with the enhancement of the reaction by latex. Values above the expected value of 14 IU/ml can be found in other inflammatory rheumatic diseases and in various non-rheumatic diseases and are also found in clinically healthy persons over 60 years of age.

  No interference has been found at therapeutic concentrations using common drug panels. High-dose hook effect: no false result without a flag has been observed up to an RF concentration of 6000 IU/Ml. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Rheumatoid Factors II. 2022-02, V 9)

Salicylate

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 2 weeks at 4^0C
- **Biological Reference Interval (Reference range)** 0-2mg/dL
- **Notes/Limitations**
  Salicylate is included in the serum Toxicology Profile
  Salicylate is a common drug used in many formulations (eg Aspirin) for its anti-inflammatory, antipyretic and analgesic properties. Salicylate overdose can cause metabolic acidosis with a high anionic gap, gastrointestinal and central nervous system disturbances, as well as encephalopathy and renal failure. Therefore, a method for the rapid and accurate determination of salicylate is needed.

  Total protein: No interference from total protein up to 14g/dl. There is a possibility that other substances and/or factors may interfere with the test and cause unreliable results. (Cobas Product Insert, Salicylate. 2023-12, V 10)

Total Iron Binding Capacity (TIBC)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** Routine hours Monday – Friday excluding Bank Holiday
- **Turnaround time –** 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range**) 40.8-76.6 µmol/L
- **Notes/Limitations**
  TIBC is included in the Iron Studies Profile
  TIBC is a calculated measurement for the maximum iron concentration that transferrin can bind.

  Calculation of TIBC = Iron + UIBC

  The serum TIBC varies in disorders of iron metabolism. In iron deficiency anemia the TIBC is elevated and the transferrin saturation is lowered to 15% or less. Low serum iron associated with low TIBC is characteristic of the anaemia of chronic disorders, malignant tumors and infections.

  Anticoagulants: Complexing anticoagulants such as EDTA, oxalate and citrate must not be used.
  Drugs: No interference was found at therapeutic concentrations using common drug panels.
  Exceptions: Oxytetracycline causes artificially high UIBC values at the tested drug level. Pathologically high values of albumin (7g/dl) decrease the apparent UIBC value significantly. In patients treated with iron supplements or metal-binding drugs, the drug-bound iron may not properly react in the test, resulting in falsely low values. The physiological function of deferoxamine containing drugs is to bind iron to facilitate its elimination from the body. Therefore any deferoxamine concentration interferes with the UIBC assay.

  In the presence of high ferritin concentrations >1200 µg/L the assumption that serum iron is almost completely bound to transferrin is not valid anymore. Therefore, such iron results should not be used to calculate Total Iron Binding Capacity (TIBC). In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings

Transferrin Saturation %

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** Routine hours Monday-Friday excluding Bank holiday
- **Turnaround time –** 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 16-45%
- **Notes/Limitations**
  Transferrin Saturation % is included in the Iron Studies Profile
  % Transferrin Saturation is a calculated measurement
  Calculation of % Saturation = Iron ÷ Total Iron Binding Capacity x 100

  In iron deficiency anemia transferrin saturation is lowered to 15% or less. Refer to Unconjugated Iron Binding capacity and Total Iron Binding Capacity.

  In the presence of high ferritin concentrations >1200 µg/L the assumption that serum iron is almost completely bound to transferrin is not valid anymore. Therefore, such iron results should not be used to calculate percent transferrin saturation (% SAT). In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings

Troponin T (High Sensitivity)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** Indicate time between initial patient review at admission and sample taken. (0hour, ≤3 hour, Random)
  Test is not available to External users.
- **Availability of assay –** In-house patients Only; 24 hours.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 24 hours at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 3-14ng/L
- **Notes/Limitations**

  Troponin T (TnT) is a component of the contractile apparatus of the striated musculature. Although the function of TnT is the same in all striated muscles, Troponin T originating exclusively from the myocardium (cardiac TnT, molecular weight 39.7 kD) clearly differs from skeletal muscle TnT. As a result of its high tissue-specificity, cardiac troponin T (cTnT) is a cardio-specific, highly sensitive marker for myocardial damage. Cardiac troponin T increases rapidly after myocardial infarction (AMI) and may persist up to 2 weeks thereafter. In contrast to ST-elevation myocardial infarction (STEMI), the diagnosis of non-ST elevation myocardial infarction (NSTEMI) heavily relies on cardiac troponin result. According to the new universal definition of myocardial infarction, MI is diagnosed when blood levels of cardiac Troponin are above the 99th percentile of the reference limit (of a healthy population) together with evidence of myocardial ischemia (symptoms, ECG changes or imaging results). The definition requires a troponin assay with an imprecision (coefficient of variation) at the 99th percentile less than or equal to 10 %.

  Cardiac troponin T (cTnT) is an independent prognostic marker which can predict the near-, mid- and even long-term outcome of patients with acute coronary syndrome (ACS). Cardiac troponin has been reconfirmed as the preferred marker of myocardial injury in the new guidelines for the diagnosis and treatment of non-ST-segment elevation myocardial infarction (NSTEMI). Troponins are released during the process of myocyte necrosis. While they are cardiac specific, they are not specific of MI only. The Universal Definition of AMI recognizes that the improvement analytical sensitivity of cTn assays used over the last few years have allowed for detection of myocardial injury associated with other etiologies. Chronic elevations of troponin T can be detected in clinically stable patients such as patients with ischemic or non-ischemic heart failure, patients with different forms of cardiomyopathy, renal failure, and diabetes. Elevated levels of troponin T correlate with the severity of coronary artery disease and to poor outcome independent of natriuretic peptide (BNP or NT-proBNP). Troponin T levels are an independent predictor of cardiovascular events including occurrence and recurrence of atrial fibrillation. Myocardial cell injury leading to elevated Troponin T concentrations in the blood can also occur in other clinical conditions such as myocarditis, heart contusion, pulmonary embolism and drug-induced cardiotoxicity. Other diagnostic tests such as myoglobin, NT-proBNP, PlGF and CRP can complement the diagnostic and prognostic information of troponin T in different indications.

  The hs-TnT assay enables more rapid diagnosis of MI but also increases the detection frequency of cardiac troponin elevations not due to an ACS. Close adherence to the Universal Definition of MI (UDMI) is mandatory to discriminate ischemic from not-ischemic causes of cardiac troponin elevations. The diagnosis of AMI requires the rise and/or fall of biomarkers (e.g. hsTNT) with at least one value above the 99th percentile, alongside one of the symptoms of ischemia, appropriate ECG changes, and/or imaging evidence of new wall motion abnormality; or the loss of viable myocardium.

  At least two measurements of hs-TnT are essential to satisfy the UDMI. The first sample to be collected on presentation and the second 6 hours later. hsTnT can be within the normal range for up to 6 hours post acute MI. Where hs-TnT ≥53ng/L consider taking further samples for hsTnT as early as 3 hours later if clinically indicated. In general, further sampling for hsTnT at 12 hours, 24 hours etc post-admission should be considered if clinically indicated.

  In an evolving MI, hs-TnT would be expected to rise above >14ng/L within the first 6 hours after presentation with a delta change of at least 100% over that same period. A delta change of 20-100% within a 6 hour period indicates a significant rise in hs-TnT and requires further testing to distinguish between acute and chronic causes of elevation in hs-TnT. A delta change of <20% within 6 hours is not consistent with an acute event.

  In addition, after exclusion of AMI, the reason for the observed hs-TnT elevation should be pursued actively to identify the possible causes of myocardial injury.

Where reinfarction is suspected, it may be difficult to interpret troponin T in this situation. Therefore, it is recommended measurement of CK as a more informative marker, in these circumstances.

Due to the release kinetics of cardiac troponin T, an initially test result <14ng/L within the first hours of the onset of symptoms does not rule out myocardial infarction with certainty. If myocardial infarction is still suspected, a second sample should be taken for repeat analysis at appropriate intervals (6-12 hours after initial assessment).

The assay is unaffected by; Rheumatoid factors up to a concentration of ≤1200 IU/mL. Biotin up to a concentration ≤4.92µmol/L or ≤1200ng/ml. Albumin up to a concentration of ≤7g/dl. There is no high-dose hook effect at troponin T concentrations up to 100000 ng/L (pg/mL).

Tests were performed on 17 commonly used pharmaceuticals. No interference with the assay was found. The following special cardiac drugs were tested. No interference with the assay was found.

Drug	**Concentration tested Mg/l**
Carvedilol	37.5
Clopidogrel	75
Digoxin	0.25
Epinephrine	0.5
Insulin aspart	1.6
Lidocaine	80
Lisinopril	10
Methylprednisolone (Urbason)	7.5
Metoprolol	150
Nifedipine	30
Phenprocoumon	3
Proafenone	300
Reteplase	33.3
Simvastatin	30
Spironolactone	75
Tolbutamide (Gilbenclamide)	1500
Torasemide	15
Verapamil	240
Valsartan	206
Sacubitril	194
Dabigatran	300
Rivaroxaban	40

In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Elecsys Troponin T hs. 2023-11, V 2)

Total Protein (TP)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 4 weeks at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

Age	Gender	Reference Interval	Units
>18 years	M/F	66-87	g/L
0-6 days	M/F	46-70	g/L
7 days-6 months	M/F	44-76	g/L
7 months-1 year	M/F	51-73	g/L
1-2 years	M/F	56-75	g/L
3-18 years	M/F	60-80	g/L
Pregnancy	F	56-76	g/L

- **Notes/Limitations**

  Plasma proteins derive primarily from synthesis in the liver, plasma cells, lymph nodes, spleen and bone marrow. In disease state both the total protein level and the ratio of the individual fractions may alter dramatically. Total protein measurements are used in the diagnosis and treatment of diseases involving the liver, kidney, bone marrow and in assessing nutritional disorders. Low levels are found in nephrotic syndrome, extensive bleeding, deficient absorption, severe burns, salt retention syndromes and Kwashiorkor syndrome (acute protein starvation). Elevated levels are found in cases of severe dehydration and in multiple myeloma. Changes in the proportions of the plasma proteins may occur without a change in the level of total protein. The albumin / globulin ratio can be significantly altered in such conditions as cirrhosis of the liver, glomerulonephritis, nephrotic syndrome, acute hepatitis, lupus erythematosis and in some acute and chronic infections.

  Dextran: No significant from Dextran up to concentrations of 30 mg/ml. Drugs: No interference was found at therapeutic concentrations using common drug panels. In very rare cases gammopathy, in particular IgM (Waldenstroms macroglobulinaemia), may cause unreliable results. (Cobas Product Insert, Total Protein Gen. 2. 2023-09, V 14)

Triglyceride (Trig)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** Consultant must phone in person if requested from Accident and Emergency department
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** 24 hours
- **Stability -** 10 days at 4^0C
- **Biological Reference Interval (Reference range)** 0.1-2.26 mmol/L
- **Notes/Limitations**
  Triglyceride is included in the Lipid Profile
  Triglycerides are esters of the trihydric alcohol glycerol with 3 long-chain fatty acids. They are partly synthesized in the liver and partly ingested in food. Elevated levels have been associated with high risk of severe atherosclerosis. High triglyceride levels and hyperlipidaemias can be an inherited trait. The determination of triglycerides is utilized in the diagnosis and treatment of patients having diabetes mellitus, nephrosis, liver obstruction, lipid metabolism disorders and numerous other endocrine disorders.

  Endogenous unesterified glycerol in the sample will falsely elevate serum triglycerides.dicynone (Etamsylate) at therapeutic concentrations may lead to false low results. Dicynone (Etamsylate) at therapeutic concentrations may lead to false low results. Ascorbic acid and calcium dobesilate cause artificially low triglyceride results. Intralipid is directly measured as analyte in this assay and leads to high triglyceride results. Actetameniphen intoxications are frequently treated with N-Acetylcysteine. N-Acetylcysteine at a plasma concentration above 166mg/L and the Acetaminophen metabolite N-acetyl-p-benzoquinone imine (NAPQI) independently may cause falsely low results. Venepuncture immediately after or during the administration of Metamizole may lead to falsely low results. In very rare cases, gammopathy, in particular type IgM, may cause unreliable results. (Cobas Product Insert, Triglycerides 2023-11. V 11)

Protein in Urine and CSF

- **Specimen –** Random urine/24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml with no additives.
  24 hour; 24hr urine collection container with no additives
- **Special Requirements -** A Consultant Must phone the Medical Scientist On-Call at *51769
  If Urinary Protein testing is required outside of routine hours.
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time -** Phoned Urgent requests; ≤ 3 hours
  In house; 24-30 hours
  All other requests; 1-2 days.
- **Stability -** 7 days at 2-8^{0}C, 1 day at 15^{0}C -25^{0}C
- **Biological Reference Interval (Reference range)**

Test	Gender	Reference Interval	Units
Urinary Protein	M/F	0-15	mg/dL
24 hr Urinary Protein	M/F	0-0.14	g/24hr
Estimated 24hr Urinary Protein (Protein Creatinine Ratio)	M/F	0-0.14	g/24hr

- **Specimen –** CSF
- **Volume –** 1ml
- **Sample/Container –** CSF sterile container
- **Colour Code -** White
- **Special Requirements –** Phone the Medical Scientist On-Call at *51769 when sending a CSF sample.
  Do not send CSF samples through the Pneumatic tube system - Hand deliver to the Laboratory Only.
- **Availability of assay –** In-house patients Only; 24 hours.
- **Turnaround time –** 75 minutes
- **Stability -** Must be assayed immediately
- **Biological Reference Interval (Reference range)** 15-45 mg/dL
- **Notes/Limitations**
  Urine:
  Protein measurements in urine are used in the diagnosis and treatment of disease conditions such as renal or heart diseases, or thyroid disorders, which are characterized by proteinuria or albuminuria.

  Urine is formed by ultrafiltration of plasma across the glomerular capillary wall. Proteins with a relative molecular mass >40000 are almost completely retained, while smaller substances easily enter the glomerular filtrate. The proportions of individual proteins excreted in urine depend on their glomerular filtration rate and the amount reabsorbed by the renal tubules. Protein size, charge and concentration define the excretion rate for each individual protein. With normal renal function only low-molecular weight proteins (such as albumin) are excreted.

  Increased proteinuria may result from:
  Increased glomerular permeability, giving rise to mainly albumin excretion;
  Defective tubular reabsorption, normal low molecular weight protein excretion;
  Overflow from plasma to urine of abnormal low-molecular weight protein;
  Production of protein by the urinary tract, as in urinary tract infection.

  In line with the majority of international guidelines, a diagnosis of pre-eclampsia can be made when hypertension arises after 20 weeks gestation and is accompanied by one or more signs including Proteinuria. Proteinuria is indicated by a spot urine protein/creatinine ratio (PCR) of >30mg/mmol (0.3mg/mg) or >300mg/day.
  Clinical Practice Guideline. The Management of Hypertension in Pregnancy. Institute of Obstetrics and Gynaecologists, Royal College of Physicians of Ireland and the Clinical Strategy and Programmes Division, Health Service Executive 2016, V 1.0

  Estimated 24 hour urinary protein (Protein Creatinine Ratio) =
  Urinary Protein/(Urinary Creatinine(mmol/l)/0.088)

  Testing is carried out in batches during routine laboratory hours (Mon-Fri Excluding Bank Holiday). The request to analyse urine for Protein out of hours/On-Call hours MUST be made In Person by the Consultant reviewing the patient, to the Medical Scientist On-Call.

  Urea:
  No significant interference up to a concentration of 1300mmol/l. Drugs: No interference has been found at therapeutic concentrations using common drug panels. Exception: Levodopa, Methyldopa and Na_2-cefoxitin cause artificially high total protein results and Calcium Dobesilate and

Phenazopyridine causes artificially low protein results. Patient samples containing >8g/L of organically bound iodine from Radiopaque media may have falsely elevated results. High levels of homogentisic acid can be found in urine of patients with the rare genetic disorder Alkaptonuria. Homogentisic acid in urine samples at concentrations > 0.6mmol/L can cause false results. The administration of gelatin based plasma replacements can lead to increased urine protein values.

24 hour urine containers may be obtained from Laboratory Reception.

CSF:
CSF protein measurements are used in the diagnosis and treatment of conditions such as meningitis, brain tumours, and infections of the central nervous systems.
Most of the proteins found in CSF originate from plasma. They enter the central nervous system by ultrafiltration through the walls of the capillaries in the meninges. Only about 20% of CSF proteins originate from intrathecal synthesis.

CSF protein originates by diffusion Increased CSF protein arises in conditions such as bacterial meningitis and encephalomyletis.

During On-Call hours, the Medical Scientist MUST be called when CSF samples are sent to the laboratory for testing. This is to ensure that there are no unnecessary delays in analysis in the interests of patient safety.

It is Prohibitive to send CSF samples through the hospital Pneumatic Shute system. This is to avoid the potential delays due to Shute system breakdown or the samples sent to the incorrect location. Send samples via a porter or in person to the laboratory for analysis.

Haemolysis:
Haemoglobin interferes. Ditaurobilirubin: No significant interference from ditaurobilirubin up to a concentration of 255µmol/L (15mg/dl)
In very rare cases, gammopathy, in particular type IgM may cause unreliable results. (Cobas Product Insert, Total Protein Urine/CSF Gen. 3. 2022-02, V 9)

Unsaturated Iron Binding Capacity (UIBC)

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –**Routine hours Monday-Friday excluding Bank Holiday
- **Turnaround time –** 24 hours
- **Stability** - 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 24.2-70.1 µmol/L
- **Notes/Limitations**

  UIBC is included in the Iron Studies Profile

  The prosthetic group of hemoglobin is the iron complex of protoporphyrin IX (heme) in which the centrally located iron atom acts as a stabilizer of oxyhemoglobin. Numerous enzymes and coenzymes require iron, e.g. peroxidases, catalases, cytochromes (which are also heme proteins), many of the enzymes of the Krebs cycle, and monoamine oxidase (which is involved in neurotransmission). The total iron content of the body is about 3 to 3.5 g. Of this amount about 2.5 g is contained in erythrocytes or their precursors in the bone marrow. Plasma contains only about 2.5 mg of iron. Iron is transported as Fe(III) bound to the plasma protein apotransferrin. The apotransferrin-Fe(III) complex is called transferrin. Normally only about one third of the iron-binding sites of transferrin are occupied by Fe(III). The additional amount of iron that can be bound is the unsaturated (or latent) iron-binding capacity (UIBC). The sum of the serum iron and UIBC represents total iron-binding capacity (TIBC). TIBC is a measurement for the maximum iron concentration that transferrin can bind.

  Calculation of TIBC = Iron + UIBC
  Calculation of % Saturation = Iron ÷ TIBC x 100

  The serum TIBC varies in disorders of iron metabolism. In iron deficiency anemia the TIBC is elevated and the transferrin saturation is lowered to 15% or less. Low serum iron associated with low TIBC is characteristic of the anaemia of chronic disorders, malignant tumors and infections.

  Anticoagulants: Complexing anticoagulants such as EDTA, oxalate and citrate must not be used.
  Drugs: No interference was found at therapeutic concentrations using common drug panels.
  Exceptions: Oxytetracycline causes artificially high UIBC values at the tested drug level. Pathologically high values of albumin (7g/dl) decrease the apparent UIBC value significantly. In patients treated with iron supplements or metal-binding drugs, the drug-bound iron may not properly react in the test, resulting in falsely low values. The physiological function of deferoxamine containing drugs is to bind iron to facilitate its elimination from the body. Therefore any deferoxamine concentration interferes with the UIBC assay.

  In the presence of high ferritin concentrations >1200 µg/L the assumption that serum iron is almost completely bound to transferrin is not valid anymore. Therefore, such iron results should not be used to calculate Total Iron Binding Capacity (TIBC) or percent transferrin saturation (% SAT). In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Unsaturated Iron Binding capacity 2021-10 V 9).

Urea

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** 7 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)**

	Gender	Reference Interval	Unit
	M/F	1.7-8.3	mmol/L
Pregnancy	F	1.0-3.8	mmol/L

- **Notes/Limitations**
  Urea is included in the Renal Profile
  Urea is the final degradation product of protein and amino acid catabolism. When proteins are broken down to amino acids they are 'deaminated' – the ammonia formed in this process is converted to urea in the liver. It is the most important pathway for eliminating excess nitrogen in the body. Urea is excreted mostly by the kidneys but minimal amounts are also excreted in sweat and degraded in the intestines by bacteria. The determination of urea is the most widely used test for the evaluation of kidney function. It is frequently used with creatinine for the differential diagnosis of pre-renal, renal and post-renal

  Causes for elevated urea:

  Pre-renal causes:
  - Water depletion;
  - Protein breakdown;
  - Cardiac decompensation.

  Renal causes:
  - Glomerulonephritis;
  - Chronic nephritis;
  - Polycystic kidney disease;
  - Nephrosclerosis;
  - Tubular necrosis.

  Post-renal causes:
  - Obstructions of the urinary tract

  Ammonium ions may cause erroneously elevated results. No interference was found at therapeutic concentrations using common drug panels. In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results. (Cobas Product Insert, UREAL 2022-03, V 11)

Uric Acid

- **Specimen –** Blood
- **Volume –** Adult; 4.9ml, Paediatric; 1.1ml
- **Sample/Container –** Serum Tube Brown Top Sarstedt Monovette
- **Colour Code -** Brown
- **Special Requirements** None
- **Availability of assay –** In-house patients; 24 hours,
  External Service Users; Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
  External Service users; 24 hours
- **Stability -** days at 4^0C -8^0C
- **Biological Reference Interval (Reference range); Serum**

Age	Gender	Reference Interval	Units
>18 years	M	202-417	µmol/L
>18 years	F	143-339	µmol/L
0-1 month	M	71-230	µmol/L
0-1 month	F	59-271	µmol/L
1 month-1 year	M	71-330	µmol/L
1 month-1 year	F	65-319	µmol/L
1-3 years	M	124-330	µmol/L
1-3 years	F	106-295	µmol/L
4-6 years	M	106-325	µmol/L
4-6 years	F	118-301	µmol/L
7-9 years	M	106-319	µmol/L
7-9 years	F	106-325	µmol/L
10-12 years	M	130-342	µmol/L
10-12 years	F	148-348	µmol/L
13-15 years	M	183-413	µmol/L
13-15 years	F	130-378	µmol/L
16-18 years	M	124-448	µmol/L
16-18 years	F	142-389	µmol/L
Pregnancy	F	120-375	µmol/L

- **Specimen –** Random urine/24 hour urine collection
- **Volume –** Random urine: 10mls.
- **Sample/Container –** Random; Urine/Specimen 70ml with no additives.
  24 hour; 24hr urine collection container with no additives
- **Special Requirements -** None
- **Availability of assay –** Routine hours Monday-Friday excluding Bank Holiday.
- **Turnaround time –** 1-3 days
- **Stability -** 4 days at 20^0C -25^0C
- **Biological Reference Interval (Reference range); Urine**

Test	Gender	Reference Interval	Unit
Uric Acid Random Urine	M/F	773-3986	µmol/L
Uric Acid 24hr Urine	M/F	1.2-5.9	mmol/24hr

- **Notes/Limitations**
  Uric acid is the final product of purine metabolism in the human organism. Uric acid measurements are used in the diagnosis and treatment of numerous renal and metabolic disorders, including renal failure, gout, leukaemia, psoriasis, starvation or other wasting conditions, and of patients receiving cytotoxic drugs.

  No significant interference from ascorbic acid up to a concentration of 0.17mmol/L. No significant interference has been found at therapeutic concentrations using common drug panels. Exceptions:

Calcium-dobesilate (e.g. Dexium®) causes artificially low uric acid levels. Uricase reacts specifically with uric acid. Other purine derivatives can inhibit the uric acid reaction. Dicynone (Etamsylate) at therapeutic concentrations may lead to false-low results. Actetameniphen intoxications are frequently treated with N-Acetylcysteine. N-Acetylcysteine at a plasma concentration above 166mg/L and the Acetaminophen metabolite N-acetyl-p-benzoquinone imine (NAPQI) independently may cause falsely low results. Venepuncture immediately after or during the administration of Metamizole may lead to falsely low results. In very rare cases, gammopathy, in particular type IgM, may cause unreliable results.
No interference has been found at therapeutic concentrations using common drug panels. Exceptions: Calcium-dobesilate (e.g. Dexium®), Levodopa and methyldopa can all cause artificially low uric acid levels in urine. High homogentisic acid concentrations in urine samples lead to false results. Dicynone (Etamsylate) at therapeutic concentrations may lead to false-low results. Acetaminophen, Acetylcysteine and Metamizole are metabolized quickly and therefore, interference from these substances is unlikely but cannot be excluded. No significant interference from urea up to a concentration of 2100mmol/L. (Cobas Product Insert, Uric Acid Ver. 2. 2023-11 V 13)

24 hour urine containers may be obtained from Laboratory Reception.

Vancomycin

- **Specimen –** Blood
- **Volume –** Adult; 2.7ml, Paediatric; 1.1ml
- **Sample/Container –** Lithium Heparin Tube Orange Top Sarstedt Monovette
- **Colour Code -** Orange
- **Special Requirements** - None
- **Availability of assay – In-house patients; 24 hours.**
- **Turnaround time –** A/E, Paediatrics, Marked Urgent; 75 minutes
  ICU/CCU/CCD, Oncology, SCBU; 2 hours
  Wards (Medical, Surgical, Maternity, Day Ward); 4 hours
- **Stability -** 14 days at 2^0C -8^0C
- **Biological Reference Interval (Reference range)** 10-20 µg/ml
- **Notes/Limitations**

  Vancomycin measurements performed with this assay, in human serum and plasma, are used for monitoring vancomycin treatment to ensure appropriate therapy. Vancomycin is a tricyclic glycopeptide isolated from Streptomyces orientalis that inhibits the synthesis of the cell wall in sensitive bacteria (mainly gram-positive bacteria and some gram-negative cocci).1,2 It displays concentration-independent activity2 and is used because of its efficacy against methicillin-resistant staphylococci and corynebacteria.3,4 Vancomycin is available as intravenous and oral formulations and is indicated in the treatment of infections such as complicated skin and soft tissue infections, community and hospital acquired pneumonia and Clostridium difficile infection, and for the perioperative antibacterial prophylaxis in patients that are at high risk of developing bacterial endocarditis.2,3,4 Monitoring of vancomycin serum or plasma levels is used to ascertain clinical efficacy and to limit potentially dose-dependent serious side effects, such as nephro- and ototoxicity1,2,4 and is recommended by guidelines and clinical societies.

  Refer to the MRHP Medicines App/hospital Consultant Microbiologist/Antimicrobial Pharmacist for guidance on dosing regimens. It is important that the date and time sample taken is clearly indicated on the sample and request form. This information will be provided on the laboratory report and is important for clinical interpretation.

  No significant interference from triglycerides up to a concentration of 11.4mmol/L. No significant interference from Rheumatoid factors up to a concentration of 1200IU/ml. No significant interference from protein from 2 to 12 g/dl. The possibility exists for interference by human anti-mouse antibodies (HAMA) in the sample, which could cause falsely elevated results. In very rare cases, gammopathy, in particular type IgM (Waldenstroms Macroglobulinaemia), may cause unreliable results. For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings. (Cobas Product Insert, Online Vancomycin Gen. 3. 2023-12, V 5)

7.4 Criteria for phoning critical results in Biochemistry

RESULTS WHICH MUST ALWAYS BE PHONED IN THE FIRST INCIDENCE OR IF RESULTS ARE WORSENING OR IF RESULTS ARE NOT IMPROVING OVER TIME

Table 1.

Serum Chemistry	Units	Critical Phone Limits In-Patients Emergency Department	Critical Phone Limits Out-Patients GPs
Sodium	mmol/L	≤120 ≥160 (see below)	≤125 ≥150 (See notes below) ≤120 ≥155 (A)
Potassium	mmol/L	≤2.5 ≥6.0 For haemolysed samples: • phone results <3.5	≤3.0 ≥6.0 ≤2.5 ≥6.0 (A) For haemolysed samples: • phone results <3.5
Corrected Calcium	mmol/L	≤1.70 ≥3.2	≤1.90 ≥3.0 ≤1.80 ≥3.5 (A) 3-3.5 (B)
Phosphate	mmol/L	≤0.35	≤ 0.3(A) ≤ 0.45 (B)
Magnesium	mmol/L	≤0.30 ≥2.00	≤ 0.40 ≥1.80 ≤ 0.40 (A)
Glucose	mmol/L	≤3.0 ≥30.0	≤3.2 ≥20.0 ≤2.5 ≥25.0 (A)
Paracetamol	mg/L	>5	
Troponin T	ng/L	Phone first instance results >50 from ED only 99th Percentile=14ng/L	
Amylase*	IU/L	≥450	≥450 ≥ ULN x 5 ≡ ≥500 (A)
CK*	IU/L	≥1000	≥1000 ≥5000 (A)
AST*	IU/L	≥400	≥400 ≥ ULNx15 ≡ ≥480 for female or ≥600 for male (B)
ALT*	IU/L	≥350	≥350 ≥ ULNx15 ≡ ≥495 for female or ≥615 for male (B)
Triglyceride*	mmol/L	≥20	≥20
Lithium	mmol/L	≥1.5	≥1.5
C Reactive Protein	mg/L	≥300	≥300 (A)
Total Bilirubin (Neonates <24hrs Old)	µmol/L	> 175	> 175
Total Bilirubin (Neonates >24hrs Old)	µmol/L	> 300	> 300
Gestational Glucose Tolerence Test GTT	mmol/L	≤ 3.5 ≥ 10 mmol/L fasting ≤ 3.5 ≥ 15 mmol/L 1Hr ≤ 3.5 ≥ 15 mmol/L 2Hr	≤ 3.5 ≥ 10 mmol/L fasting ≤ 3.5 ≥ 15 mmol/L 1Hr ≤ 3.5 ≥ 15 mmol/L 2Hr
Lactate	mmol/l	> 4	> 4 mmol/l
Vancomycin	µg/mL	> 20	***Test not routinely available
Gentamicin	mg/L	<0.5 > 10	***Test not routinely available
Estimated 24 hr Urinary Protein/Spot Protein/Protein Creatinine Ratio (PCR)	g/24hrs		>0.3 (Ante Natal OPD Patients Only)

Table 2. Results which must be phoned in the First Instance & Again if the Results are significantly (≥50%) higher than previous levels reported in LIS.

Serum Chemistry	Units	Critical Phone Limits – In-patients and Emergency Dept	Critical Phone limits - Out-patients and GPs
Amylase*	IU/L	≥450	≥450 ≥ ULN x 5 ≡ ≥500 (A)
CK*	IU/L	≥1000	≥1000 ≥5000 (A)
AST*	IU/L	≥400	≥400 ≥ ULNx15 ≡ ≥480 for female or ≥600 for male (B)
ALT*	IU/L	≥350	≥350 ≥ ULNx15 ≡ ≥495 for female or ≥615 for male (B)
Triglyceride*	mmol/L	≥20	≥20
Lithium	mmol/L	≥1.5	≥1.5
C Reactive Protein	mg/L	≥300	≥300 (A)

Table 3 Results which must be phoned but the preceding result may be taken into account as documented below

Serum Chemistry	Units	Critical Phone Limits – In-patients and Emergency Dept	Critical Phone limits - Out-patients and GPs
Urea**	mmol/L	>15 mmol/L provided result >8 mmol/L above baseline/preceding result (See Notes Below)	>15 mmol/L provided result >8 mmol/L above baseline/preceding result ≥30 New/ significant increase in a non-dialysis patient (A)
Creatinine **	μmol/L	>175 μmol/L (Female) or >200 μmol/L (Male) provided the result > 44 μmol/L above admission/preceding result (See Notes Below)	>124 μmol/L (Female) or >150 μmol/L (Male) provided the result > 44 μmol/L above baseline/preceding result ≥354 New/ significant increase in a non-dialysis patient (A)
eGFR	Ml/min	≤ 15 New presentation (A)	≤15New presentation (A)

Notes/ Guidelines provided

- As per HSE guidelines Category A results are likely to require action within 2 hours (see link below)
- As per HSE guidelines Category B results have urgent implications for the patient and must be communicated to the patient's doctor or their nominee today (see link below)
- Category A and Category B are shown above to show how critical results escalation should occur

Reference: Communication of Critical Results for Patients in the Community. National Laboratory Handbook. 2019. M Keoghan, A Mannion, J Mc Cormack.

8.0 HAEMATOLOGY DEPARTMENT

Haematology Department
Phone 96274 – (057 8696274)
Phone 96279 – (057 8696279)

Position	Contact Name	Contact Number	Contact Email
Chief Medical Scientist	Frances Earley	057 86 96840	Frances.Earley@hse.ie
Senior Medical Scientist	Hugh O'Byrne	057 86 96274	Hugh.OByrne@hse.ie
Consultant Haematologist	Dr Kanthi Perera	*51920 (057 9321501)	
Consultant Haematologist	Dr Gerard Crotty	*51920 (057 9321501)	

The Haematology Department provides a routine service to the hospital and to general practitioners. In addition a referral service for more specialised tests is provided.
An on call service is provided to the hospital only for processing of non-deferrable/urgent test requests.

8.1 Routine Haematology tests and profiles

Routine Haematology Tests and Profiles are available daily.

Please Use Blue and White Biochemistry/Haematology Forms and include relevant clinical details and details of anticoagulant therapy.

Inpatient Specimens must be received in the department no later than 16:00 to ensure same day analysis. If results are required by a certain time please indicate this clearly on the request form.

Urgent requests must be telephoned to the laboratory so that tests can be given priority.

Test Name	Code	Sample	Volume	Sample/Container	Container Colour	Colour Code	TAT	Comment
Full Blood Count (FBC) including Automated White Cell Differential	FBC	Blood	2.7ml	EDTA		Red	1 day	FBC consists of Red Blood Cells (RBCs), Haemoglobin (Hb), Haematocrit (HCT), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH), Mean Cell Hb Concentration (MCHC), RBC Distribution Width (RDW), Platelets (PLT), Nucleated RBCs (NRBC), White Blood Cells (WBCs), Neutrophils, Lymphocytes, Monocytes, Eosinophils, Basophils FBC/DIFF Stability: 72hours
Blood Film Examination		Blood	2.7ml	EDTA		Red	• Routine Blood Film Review: 1-3 days • Urgent Medical Scientist Review: 4 hours • Urgent Consultant Blood Film Review: 6-8 hours/24 hours depending on urgency • Routine Consultant Blood Film Review: 14 days	
Reticulocyte Count	RET	Blood	2.7ml	EDTA		Red	1 day	Sample Stability= 24 hours
Erythrocyte Sedimentation Rate	ESR	Blood	2.7ml	EDTA		Red	1 day	Sample Stability = 12 hours
Infectious Mononucleosis Screen	IM	Blood	2.7ml	EDTA		Red	1 days	Sample Stability: Processed ASAP within same sample date.
Kleihauer Test (Fetal Maternal Haemorrhage)	FMH	Blood	2.7ml	EDTA		Red	1-3 days	Need Clinical Details. Processed Mon, Wed and Fri only. FMH >4mls sent to Coombe for confirmation.

Test Name	Code	Sample	Volume	Sample/Container	Container Colour	Colour Code	TAT	Comment
Malaria Screen Includes Rapid Diagnostic Test (RDT) and Microscopy (Thick and Thin Blood Film Examination)		Blood	2.7ml	EDTA		Red	TAT for • Rapid Diagnostic Test (RDT) 1 day • Microscopy for negative RDT 2 days • Microscopy for Positive RDT 1 day Malaria confirmation 7 days from Malaria Reference Lab London	Questionnaire must be completed prior to testing to include recent travel history. This is available from Haematology Lab.
Sickle Cell Screen (Adults and Paeds >6 months)		Blood	2.7ml	EDTA		Red	1-3 days	If screen is positive, sample sent for Hb electrophoresis to St James' Special Haematology. Hospital only request
Coagulation Screen (PT & APTT)		Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: PT=24 hrs APTT=4 hrs, APTT for patients on Heparin =2 hrs
Prothrombin Time (PT/INR)		Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: PT=24 hrs
Activated Partial Thromboplastin Time (APTT/APTT ratio)		Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: APTT=4 hrs APTT for patients on Heparin =2hrs
D-Dimer		Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: D-Dimer=8 hrs

Test Name	Code	Sample	Volume	Sample/Container	Container Colour	Colour Code	TAT	Comment
Fibrinogen Clauss	FIB-C	Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: Fibrinogen = 4 hrs
Mixing Studies		Blood	3ml	Sodium Citrate		Green	1 day	Fill to green line on bottle. Date and Time taken MUST be recorded on the request form and the sample. Sample Stability: PT mix = 24 hours APTT mix = 4 hours

Turnaround Times for Reporting Haematology Tests
Turnaround times are from sample receipt in the Laboratory

Test Name	Priority Wards (A/E, Paeds A/E, Critical Care Department non-serial Bloods OR Critical Urgent Samples*	Routine (In house) 1 day refers to a routine working day	Routine (GP & OPD) Routine hours	Comment
FBC Including automated white cell differential	1 hour	1 Day	24 hours	
Blood Film examination	See comment	See comment	See comment	• Routine Blood Film Review 1-3 days • Urgent Medical Scientist Review 4 hours • Urgent Consultant Blood Film Review 6-8 hours/24 hours depending on urgency • Routine Consultant Blood Film Review 14 days
Reticulocyte count	1 hour	1 Day	24 hours	
ESR	1 hour	1 Day	24 hours	
Infectious Mononucleosis screen	1 Day	1 Day	24 hours	
Kleihauer (FMH)	NA	See comment	NA	1-3 Days. Processed Mon, Wed and Fri only.
Malaria Screen	1 Day**	1 Day**	NA	
Sickle Cell Screen	1 Day**	1 Day**	1-3 Days	
Coagulation Screen (PT & APTT)	1 hour	1 Day	24 hours	
PT/INR	1 hour	1 Day	24 hours	
APTT/APTT ratio	1 hour	1 Day	24 hours	
D-Dimer	1 hour	1 Day	24 hours	
Fibrinogen Clauss	1 hour	NA	NA	
Mixing Studies	2 hours	1 Day	1 Day	

* **Contact the laboratory regarding critical urgent samples so that tests can be given priority eg Theatre Bloods.**
**The TAT for Sickle screen and Malaria screen is for when the result is not abnormal. The TAT will increase if further testing/investigations are indicated. Positive Sickle screen may be referred to external laboratory for full Haemoglobinopathy screen. Positive Malaria will be referred to Hospital for Tropical Diseases, London for confirmation of species.

8.2 Bone Marrows

Bone Marrows are performed in the Day Ward MRH Tullamore by arrangement with the Consultant Haematologist. They are processed in the Haematology Department at Midland Regional Hospital, Tullamore. For Bone Marrow RESULTS contact the Haematology Department Midland Regional Hospital, Tullamore 58352 or (057) 9358352.

8.3 Haematology Clinical Service

The Haematology Department offers a clinical service, both for diagnosis and management advice. The Consultant Haematologist(s) may be contacted on *51920.
Haematology Clinics are held every second Monday in Portlaoise.
Appointments can be made by sending a referral letter to the Haematology Secretary in the Laboratory in the Midland Regional Hospital at Tullamore.

8.4 Anticoagulant Service

An Anticoagulant Clinic, for the monitoring of Warfarin treatment, is held on Tuesdays, Thursdays and Fridays, in the out-patients department. New patients should be referred directly to the Warfarin Clinic, with the anticoagulant referral form or letter. Please indicate clearly the level and duration of anticoagulant treatment required.

The Warfarin clinic is managed jointly by the Medical Consultants. The Consultant Haematologist(s) is available to discuss complicated issues relating to anticoagulation.

8.5 Haematology Biological Reference Intervals (Reference Ranges)

Refer to Section 13.7. Biological Reference Intervals (Reference Ranges) for further information.

Haematology Full Blood Count Reference Ranges for Adults and Children

	0-3D	4D-1M	1M+1D-2M	2M+1D-6M	6M+1D-1Y	1Y+1D-2Y	2Y+1D-6Y	6Y+1D-12Y	12Y+1D-Adult
Red Cell Count *10^{12}l	5-7	4-6.6	3-5.4	3.1-4.3	4.1-5.3	3.9-5.1	4-5.2	4-5.2	4.5-5.5 M 3.8-4.8 F
Haemoglobin g/dl	14-22	15-21	11.5-16.5	9.4-13	11.1-14.1	11.1-14.1	11-14	11.5-15.5	13.5-17.5 M 12-16 F
Haematocrit(Hct) l/l	0.45-0.75	0.45-0.67	0.33-0.53	0.28-0.42	0.30-0.40	0.30-0.38	0.34-0.40	0.35-0.45	0.4-0.5 M 0.37-0.46 F
Mean Cell Volume (MCV) fl	100-120	92-118	92-116	87-103	68-84	72-84	75-87	77-95	79-99
Mean Cell Hb pg	31-37	31-37	30-36	27-33	24-30	25-29	24-30	25-33	27-32
Mean cell Hb Conc (MCHC) g/dl	30-36	29-37	29-37	28.5-35.5	30-36	32-36	31-37	31-37	31.5-34.5
RDW %	11-16	11-16	11-16	11-16	11-16	11-16	11-16	11-16	12-15
Reticulocytes x10^9l	120-400	50-350	20-60	30-50	40-100	30-100	30-100	30-100	50-100
White cell count x10^9l	10-26	7-23	5-19	5-15	6-18	6-16	5-15	5-13	4-11
Neutrophils x10^9l	4-14	3-5	3-9	1-5	1-6	1-7	1.5-8	2-8	2-7
Lymphocytes x10^9l	3-8	2-8	3-16	4-10	4-12	3.5-11	6-9	1-5	1-4
Monocytes x10^9l	0.5-2.0	0.5-1.0	0.3-1.0	0.4-1.2	0.2-1.2	0.2-1.0	0.2-1.0	0.2-1.0	0.2-1.0
Eosinophils x10^9l	0.1-1.0	0.1-2.0	0.2-1.0	0.1-1.0	0.1-1.0	0.1-1.0	0.1-1.0	0.1-1.0	0.02-0.5
Basophils x10^9l	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1	0.02-0.1
NRBC x10^9l	<0.4								0.00
Platelets x10^9l	150-450	210-500	210-500	210-650	200-550	200-550	200-450	180-400	140-400

Source: Practical Haematology, Dacie and Lewis, 12th Edition.

Pregnancy Related Full Blood Count Reference Ranges

Parameter	First Trimester	Second Trimester	Third Trimester*	Trimester Not Stated
RBC ($x10^{12}$/L)	3.52-4.52	3.20-4.41	3.10-4.44	3.10-4.52
Hb (Hgb) (g/dL)	11.0-14.3	10.0-13.7	9.8-13.7	9.8-14.3
HCT (L/L)	0.31-0.41	0.30-0.38	0.28-0.39	0.28-0.41
MCV (fL)	81-96	82-97	91-99	81-99
WBC ($x10^9$/L)	5.7-13.6	6.2-14.8	5.9-16.9	5.7-16.9
Neutrophils ($x10^9$/l)	3.6-10.1	3.8-12.3	3.9-13.1	3.6-13.1
Lymphocytes ($x10^9$/L)	1.1-3.5	0.9-3.9	1.0-3.6	0.9-3.9
Monocytes ($x10^9$/L)	0.0-1.0	0.1-1.1	0.1-1.1	0.0-1.1
Eosinophils ($x10^9$/L)	0.0-0.6	0.0-0.6	0.0-0.6	0.0-0.6
Basophils ($x10^9$/L)	0.0-0.1	0.0-0.1	0.0-0.1	0.0-0.1
Platelets ($x10^9$/L)	174-391	171-409	155-429	155-429
NRBCs ($x10^9$/L)	0.0	0.0	0.0	0.0

* Third trimester reference range is applicable for 6 weeks post deliver

Source: Blood Cells. A Practical Guide. Barbara J. Bain; 3rd Edition

Suggested literature:
Laboratory values in normal Pregnancy. F. Gary Cunningham. University of Texas Southwestern Medical Centre. Department of Obstetrics and Gynaecology, Dallas, TX, USA
BSH Guidelines on the management of Iron deficiency in pregnancy.

ESR Reference Ranges

Sex	Age (years)	Value (mm/hr)
Male	**<50**	**0-15**
Male	**>50**	**0-20**
Female	**<50**	**0-25**
Female	**>50**	**0-30**

Source: Jacobs DS, DeMott WR. Laboratory Test Handbook, 5th Ed. Lexi- Comp Inc, 2001, 484 – 485.

Coagulation Reference Ranges

Adult Coagulation Tests Reference Ranges

TEST	RANGE	UNITS
PT	10.1-12.9	seconds
APTT	24.4-36.3	seconds
FIB-C	2.1-3.9	g/L
D-DIMER	0-500	ng/mL

Source: Adult reference ranges have been established and verified in-house.

Paediatric Coagulation Tests Reference Ranges

Test	1 day	5 days	30 days	90 days	180 days
PT (secs)	10.1-15.9	9.5-15.3	9.3-14.3	9.6-14.2	10.7-13.9
APTT (secs)	31.3-53.6	25.4-59.8	25.6-55.2	24.1-50.0	28.1-42.9
FIB–C (g/L)	1.7-4.0	1.6-4.6	1.6-3.8	1.1-3.8	1.2-3.9

Source: Andrew et al, Blood, Vol 70, No 1 (July), 1987:165-72

8.6 Haematology Test Limitations

Haematology Tests:

FBC including automated white cell differential and Reticulocyte count: (Reference – Sysmex XN series (XN-2000) Automated Hematology Analyser, Instructions for Use rev 03/2017)

- FBC is performed on the Sysmex automated haematology analyser using Sysmex products, the use of which have been validated to optimize product performance and meet product specifications.
- Below is a Table to document system limitations from possible sample interferences.

FBC Parameter	Possible Interference	Effect on Result
WBC	Leucocyte Aggregation	Erroneously low WBC
WBC	PLT Clumps, Fibrin, Cryoprotein, Cryoglobulin, Giant Platelets	Erroneously high WBC
RBC	Red cell agglutination (cold agglutinins), RBC fragments, microcytes	Erroneously low RBC
RBC	Leucocytosis(>100 $x10^9$/L), Giant platelets	Erroneously high RBC
HgB	Leucocytosis(>100 $x10^9$/L), Lipaemia, abnormal protein	Erroneously high HgB
HCT	Red cell agglutination (cold agglutinins), microcytes, RBC fragments	Erroneously low HCT
HCT	Leucocytosis (>100 $x10^9$/L), Severe diabetes, Uremia, Spherocytosis.	Erroneously high HCT
PLT	Platelet clumps. Giant platelets	Erroneously low platelets
PLT	Microerythrocytes, fragmented RBC or leucocytes, Cryoprotein, Cryoglobulin	Erroneously high platelets
RET	Red cell agglutination (cold agglutinins), PLT clumps, Giant platelets, Fragmented leucocytes, Malaria, Howell jolly bodies	Erroneously high reticulocyte count.

ESR

ESR: (Reference – ALIFAX TEST1 2.0 User Manual rev 1.1, 2023-07-27)

- The phenomenon of erythrocyte sedimentation is related to the fresh blood sample, and is transient. It is therefore not a corpuscular or molecular component of the blood sample.
- Inadequate sample mixing.

Infectious Mononucleosis screen

Infectious Mononucleosis Screen: (Reference – Clearview IM II Product Insert rev 03/2023)

- The test should be used for the detection of infectious mononucleosis antibodies in whole blood, serum or plasma only. Neither the quantitative value nor the rate of increase Infectious mononucleosis antibody concentration can be determined by this qualitative test.
- The test will only indicate the presence of Infectious Mononucleosis antibodies in the specimen and should not be used as the sole criteria for the diagnosis of Infectious mononucleosis infection.
- Results must be interpreted together with other clinical information available to the physician.
- If the test result is negative and clinical symptoms persist, additional testing using other clinical methods is recommended. A negative result does not at any time preclude the possibility of Infectious Mononucleosis infection.

Kleihauer (FMH)

Kleihauer (FMH): (Reference – Guest Medical Foetal Red Cell Detection Kit, Product Insert rev 10/2023)

- This test is reliant upon visual examination and interpretation by trained professionals to determine the presence of foetal red cells in the maternal blood specimens. F-cells containing intermediate levels of haemoglobin F may not stain intensely red and can complicate result interpretation.
- Patients with sickle cell disease or ß-thalassenia are known to show poor elution of some of their red blood cells. This can affect interpretation of results.
- Patients with Hereditary Persistance of Fetal Haemoglobin (HPFH) are likely to show up to 20% of their red blood cells staining pink due to elevated levels of HbF. This can lead to false positive result interpretation.
- Over-fixation of the specimen during the test procedure may lead to false positive results.
- Erroneous results may occur as a result of improper storage of specimens prior to testing.

Malaria Screen

1. BinaxNOW MalariaTest Kit (Reference – BinaxNOW Malaria, Product Insert rev 02/2017)

- A negative test result does not exclude infection with malaria, particularly at low levels of parasitaemia. Therefore, the results obtained should be used in conjunction with other laboratory and clinical findings to make an accurate diagnosis. As is often done in serial microscopy testing, another sample can be collected and retested.
- The kit detects antigen from both viable and non-viable malaria organisms, including gametocytes and sequestered p. falciparum parasites. Test performance depends on antigen load in the specimen and may not correlate directly with microscopy performed on the same specimen.
- Residual plasmodium antigen may be detected for several days following elimination of the parasite by anti-malarial treatment and the test should not be used for monitoring treatment of malaria.
- Samples with positive rheumatoid factor (Rf) titers may produce false positive results. Rfs are autoantibodies, and positive Rf titres are associated with acute autoimmune disorders, such as rheumatoid arthritis, as well as with chronic viral infections (such as hepatitis C) and parasitic infections. In addition, positive Rf titres are present in 1 to 4% of the general population. Like other rapid malaria antigen detection tests, the BinaxNOW test has been shown to generate false positive results in samples of some individuals with positive Rf titres.
- Analytical reactivity testing demonstrates that the pan malarial test line (T2) is capable of detecting all four malaria species (P.f., P.v., P.o., or P.m). However, during clinical trials, insufficient data was generated to support clinical performance claims for the detection of P.m. or P.o. Clinical performance claims for this test are made for P.f. and P.v detection only.
- The test is not intended for use in screening asymptomatic populations.

2. CareUS™ Malaria Test kit (Reference – CareUS Malaria Product Insert rev 10/2024.
- The following anticoagulants have been validated for use with this test: heparin, EDTA and citrate.
- This test is designed to detect HRP2 and pLDH antigens of Malaria (P. falciparum, P. vivax, P. malariae, and P. ovale). A definitive clinical diagnosis should not be made based on the result of this test, but should be made by a qualified physician after all clinical and laboratory finding have been evaluated.
- The prozone effect may cause false negative result.
- This test may produce a positive result with faint test line or false negative is possible due to low parasite density.
- May produce false positive results after successful anti-malarial treatment. Therefore it's not recommended for monitoring response to anti-malarial treatment.
- Whole blood samples with anticoagulants are stored at 2-8°C and must be tested within 2 days. Only clear, non-hemolysed specimens can be used.

3. Microscopy
- Confidence limits for quantification of parasites are wide due to a manual counting technique and are dependent on the level of parasitaemia and the number of fields screened.

Sickle Cell Screen

Sickle Cell Screen: (Reference – Streck Sickledex Instructions for Use, rev 08/2021)

- False positives may occur in patients with erythrocytosis, hyperglobulinaemia, extreme leucocytosis or hyperlipidaemia. Coarse flocculation may occur in these samples due to the elevated levels of total serum protein. These patient samples may be washed in normal physiologic saline, centrifuged and the 10µl of the packed cells used for testing.
- False positives or negatives may occur in patients with severe anaemia.
- The limit of detection is 15% Hb-S with a total haemoglobin of 15g/dl.
- 100% sensitivity and 100% specificity verified by testing 166 samples (137 negative, 29 positive)
- False negatives may occur in infants under 6 months of age due to elevated levels of haemoglobin F.
- False positive or negatives may occur in patients with a recent blood transfusion.
- Positive results may occur in patients with some rare sickling haemoglobin subtypes such as haemoglobin C Harlem, or haemoglobin C Georgetown.
- Sickledex is a qualitative screening procedure and does not differentiate between sickle cell disease (S/S) and sickle cell trait (A/S).
- It should be noted that the test times reads for some non-patient samples (proficiency or control material), may not be evident at 6 minutes and may take up to 60 minutes to be resolved.

PT: (Reference - HemosIL, RecombiPlasTin 2G, Product Insert rev 03/2019).

- PT results may be affected by many commonly administered drugs and further studies should be made to determine the source of unexpected abnormal results.
- PT results are not affected by haemoglobin up to 500mg/dL, bilirubin up to 30mg/dL, triglycerides up to 1000mg/dL and Heparin up to 1U/mL.

APTT: (Reference - HemosIL, SynthASil, Product Insert rev 06/2017).

- APTT results may by affected by many commonly administered drugs and further studies should be made to determine the source of unexpected abnormal results.
- APTT results are not affected by haemoglobin up to 500mg/dL, bilirubin up to 26mg/dL, triglycerides up to 1000mg/dL.

D Dimer: (Reference - HemosIL, D-Dimer HS 500, Product Insert rev 04/2018).

- D-Dimer results are not affected by haemoglobin up to 500mg/dL, bilirubin up to 18mg/dL, triglycerides up to 1327mg/dL and Rheumatoid Factor up to 1400IU/mL.
- The monoclonal antibody (MA-8D3) used in the Latex Reagent has major specificity for the D-Dimer domain of cross-linked Fibrin Degradation Products was seen with plasma samples spiked with purified Fragments D and E above 10µg/ml.
- Specimens from patients who have received preparation of HAMA may cause an over-estimation of results in immunoassays that utilize mouse monoclonal antibodies. The Reaction Buffer contains a blocking reagent against HAMA to minimize this interference on the assay results.

Fibrinogen: (Reference - HemosIL, Q.F.A. Thrombin (Bovine), Product Insert rev 06/2017).

- Fibrinogen results are not affected by haemoglobin up to 375mg/dL, bilirubin up to 23mg/dL, triglycerides up to 880mg/dL and Heparin up to 2U/mL.
- Fibrinogen assay results may be affected by degradation (fibrin or fibrinogen) in the plasma assayed.

8.6 Criteria for phoning critical results in Haematology and Coagulation

The following are the instances in which Haematology/Coagulation reports should be given by **phone**.
Phone **Critical Results**- results outside the following ranges on patients with no previous history or whose results differ significantly from previous results:

Test	Analyte	Units	Critical Result	Comment	Urgency Category*
FBC	Hb	g/L	<8.0		A
			>19	Adults	A
	WBC	x 10^9/L	>25		B
	Neutrophils	x 10^9/L	<0.8		B
	Platelets	x 10^9/L	<100	Check for clots/clumping	B
			>1000		B
ESR	ESR	mm/hr	>100		B
Blood film examination			Refer to P/HAEM/SOP/005 for criteria for urgent Medical Scientist and Consultant blood film review.	Contact the Consultant Haematologist/ Haematology Team via switch at MRH Tullamore *51920.	Refer to P/HAEM/SOP/005 for TATs
Coagulation	PT/APTT	secs	Significantly abnormal	Where the patient is not on anticoagulant therapy	A
	INR	Ratio	>5.0	Patients on Warfarin	A
	APTT	Secs	>100	Patients on IV Heparin	A
	Fib-Clauss	g/L	≤1.5		A
	D-Dimer	ng/ml	>10,000		A
Malaria screen	M. parasites	N/A	Positive		A
Sickle cell screen		N/A	Positive	Inpatients	B
				Inpatient for Theatre	A
Infectious Mononucleosis screen		N/A	Positive		B
Kleihauer (FMH)		mls	>2 mls		B
All significantly abnormal results should be phoned to the appropriate Doctor.					
Any unexpected result should be also be discussed with the appropriate Doctor.					

Haematology and Coagulation Critical Results Phone Criteria.

*** Category A**: This result is likely to require action within 2 hours.
*** Category B**: This result has urgent implications for the patient and must be communicated to the patient's doctor/nominee today. (Reference HSE 2019 Communication of Critical Results for Patients in the Community National Laboratory Handbook).

9.0 BLOOD TRANSFUSION (INCLUDING HAEMOVIGILANCE AND TRACEABILITY)

Blood Transfusion Laboratory
Phone 96269 – (057 8696269)

Position	Contact Name	Contact Number	Contact Email
Chief Medical Scientist	Frances Earley	057 86 96840	Frances.Earley@hse.ie
Senior Medical Scientist	Charlotte Muldowney	057 86 96269	Charlotte.Muldowney@hse.ie
Haemovigilance Officer	Eithne Lacey	057 86 96066	Eithne.Lacey@hse.ie
Consultant Haematologist	Dr Kanthi Perera	*51920 (057 9321501)	
Consultant Haematologist	Dr Gerard Crotty	*51920 (057 9321501)	

Blood Transfusion Service

The Blood Transfusion Service in Midland Regional Hospital, Portlaoise is a Consultant led service. A description of the Tests and service provided is detailed in this section.
Routine antenatal group and screen specimens are sent to Midland Regional Hospital, Mullingar, who provide the regional antenatal screening service**.**

Routine Crossmatching
Crossmatched blood is made available for routine transfusions and for operation cover in accordance with the Maximum Blood Ordering Schedule (MBOS) in place for Obstetrics and Gynaecology and General Surgery. Requests should be sent at least 24 hours before blood is required to give sufficient time to ensure blood is available for patients who have irregular antibodies. Crossmatched blood will be made available for the time and date given on the request form unless informed otherwise. Crossmatched blood is routinely held for 48 hours after surgery

Emergency Crossmatching
Crossmatched blood may be made available in 45 minutes minimum in an emergency if no irregular clinically significant red cell antibodies are present. Uncrossmatched, group specific blood is available for issue in extreme emergencies upon request. Alternatively, four emergency O Rh (D) negative, K neg units are available. These units will be issued with labels and compatibility reports stating **"uncrossmatched blood at request of Medical Doctor".**

In addition an emergency Neonatal Red Cell Unit for Paediatric use O Rh (D) negative, (C neg, E neg, K neg, Hb S neg CMV neg) is kept in stock at the request of the Consultant Haematologist (s) to comply with best practice guidelines.

The Blood Transfusion Department reports all near miss events which occur in the Blood Transfusion Laboratory to the National Haemovigilance Office.
The Blood Transfusion Department in conjunction with the Transfusion Surveillance Officer & Laboratory Quality Officer compile an annual report to the Health Products Regulatory Authority (HPRA) detailing quality systems in place, status of accreditation and blood usage.

Haemovigilance Service

The Haemovigilance Service in Midland Regional Hospital, Portlaoise is a Consultant led service with one Transfusion Surveillance Officer (TSO) on site. Two Medical Scientist staff deputise for the TSO as required. The National Haemovigilance scheme is dedicated to the achievement of national standard practice and quality of care for all patients, before, during and following completion of transfusion.

Haemovigilance guidelines concerning the ordering and clinical use of blood, blood components and products are available in Nursing Administration in a red folder titled 'Blood Transfusion Policies, Procedures and Guidelines' and on Hospital Q Pulse.

9.1 Blood Transfusion Requests during Routine/Out of Hours including Urgent Requests

Routine Blood Transfusion Requests during Routine Hours
Blood Transfusion Specimens and request forms may be sent through the pneumatic tube system.

Urgent Blood Transfusion Requests during Routine Hours
Please telephone urgent requests directly to the laboratory (Ext.96269) to ensure priority processing.

All Blood Transfusion Requests Out of Hours
The Medical Scientist on call **MUST** be contacted on speed dial *51775 (087 6394811) or through the switch board (dial 3000) for the processing of **all Blood Transfusion requests that need to be processed out of normal working hours.**

Refer to Pathology Department Opening Times section 3.1.

9.2 Blood Transfusion Specimen and Request Form General Information

A blood transfusion specimen and request form is required for all Blood Transfusion tests/requests listed in the Table below.

The Electronic Blood Tracking System (EBTS) is the preferred method for labelling inpatient samples and request forms. Hand held devices are available in all clinical areas.
When the EBTS is not working, ONLY handwritten specimens and request forms are permitted.

Check with the Blood Transfusion Department to see if there is a valid Group and Screen Sample and request form already available in the Blood Transfusion Department to prevent duplicate testing.

2nd Sample Requirements:

If a patient requires transfusion of Red Cells, Plasma, Platelets and/or Anti D and they do not have an historical blood group on the Laboratory Information System, then a properly labelled 2nd Blood Transfusion sample and request form will be requested for ABO/Rh confirmation by the Laboratory who will contact you.
The 2nd sample will only be requested by the Laboratory if transfusion is required.
DO NOT take two Blood Transfusion specimens / request forms in advance.
The 2nd sample MUST be taken at a separate time.
Failure to provide this 2nd sample will result in the patient having to receive O Negative units.

All units of blood/blood components/products are labelled with patient's details.
Refer to section 9.9 for further information on additional requests.

Blood Transfusion Specimens

Please ensure bottles are within their expiry date. Samples sent to the laboratory using expired sample bottles will be rejected.

Test Name	Code	Sample Type for Adults	Volume	Sample/Container	Container Colour	Specimen Type for Neonates/ Paediatrics/ Cord (see note)	Turnaround Time *	Comment
Group & Antibody Screen /Hold**		7.5 ml whole blood SARSTEDT EDTA Red bottle				4.9 ml whole blood SARSTEDT PAEDIATRIC EDTA red bottle Minimum volume 2 ml	1 day	
Group & Antibody Screen /Hold(Antenatal)**		7.5 ml whole blood SARSTEDT EDTA Red bottle				N/A	3-5 days	
Group, Screen & Cross-match**		7.5 ml whole blood SARSTEDT EDTA Red bottle				4.9 ml whole blood SARSTEDT PAEDIATRIC EDTA red bottle Minimum volume 2 ml	1 day Emergency cross match minimum 45 mins	
Group, Screen & Cross-match on Neonates 0-4 months of age NOTE Mothers Sample/request Form and Baby's sample/request form required		Maternal transfusion specimen 7.5ml EDTA KE in a RED Blood Transfusion Sarstedt bottle.				Baby's transfusion specimen: 4.9ml EDTA KE in a RED Paediatric Blood Transfusion SARSTEDT bottle.	1 day Neonatal Paedipack needs to be ordered from IBTS	
Blood, Blood Components & Products for Transfusion				**Refer to sections 9.12 to 9.19**				
Group & Coombs Test (Cord Blood)		N/A				7.5 ml whole blood SARSTEDT EDTA Red bottle	1 day	
Group & Coombs Test		7.5 ml whole blood SARSTEDT EDTA Red bottle				4.9 ml whole blood SARSTEDT PAEDIATRIC EDTA red bottle Minimum volume 2 ml	1 day	
Direct Coombs Test		7.5 ml whole blood SARSTEDT EDTA Red bottle				4.9 ml whole blood SARSTEDT PAEDIATRIC EDTA red bottle Minimum volume 2 ml	1 day	
Transfusion Reaction Investigation**				**Refer to section 9.23**			Contact Laboratory	

* Routine working day

** If Antibody Identification is required, this will necessitate a delay. Further investigation may also be required by referral to the IBTS. The Medical Scientist will contact a member of the patient's medical team.

Note DO NOT USE 2.7ml FBC bottles.

9.3 Blood Transfusion Reports

Blood Transfusion reports are dispatched to the ward areas by the portering staff twice daily at 13:00 and 17:00, excluding weekends and bank holidays. Urgent reports are phoned/faxed.
Any unexpected results/issues pertaining to transfusion are phoned to the relevant clinican/team.
It is the policy of the Blood Transfusion Laboratory NOT to give verbal reports of Blood Groups.

9.4 Patient Consent and Patient Information Leaflets

A verbal consent is required for transfusion of blood, blood components and products (except in emergency cases). Consent should be recorded by the attending doctor, by ticking the box on the front of the 'Blood Component/Product Transfusion and Prescription Record Sheet' (BTPRS).

A Blood Transfusion information leaflet should be provided before commencing the transfusion. Refer to Haemovigilance guideline P/BT/HV/008 titled 'The completion and use of a Blood Component/ Product Transfusion and Prescription Record Sheet'.

If the patient is unable to receive the leaflet (e.g. unconscious) then they should be informed, by their clinician that they have received a transfusion as part of their treatment.

If the patient is unable to understand the leaflet (e.g. child, or an adult with comprehension or language difficulties) then the information should be related to them in a language they understand. This may necessitate requesting an interpreter.

9.5 Prescription

Red Cells, Plasma, Platelets, Coagulation Factors and Anti D are issued from the Blood Transfusion Laboratory. Refer to section 9.19 for further details on Coagulation Factors issued by the Laboratory.

- For the prescription of Red Cells, Plasma, Platelets and Coagulation Factors, refer to Haemovigilance guideline P/BT/HV/008 titled 'The completion and use of a Blood Component/Product Transfusion and Prescription Record Sheet' (BTPRS).
- Anti D is prescribed on an 'Anti D Prescription and Administration document'.
- Albumin and Immunoglobulin are prescribed on a Drug Prescription Record Sheet and are issued by the Pharmacy Department.

9.6 Patient Identification

The patient's identity **must** be positively confirmed prior to the completion of the request form and reserving of the specimen.
Ask the patient to state his/her name and Date of Birth, and check the patients stated details against their identity band.

All Portlaoise identity bands are clearly labelled with Midland Regional Hospital Portlaoise to differentiate them from other hospital bands.

If the patient is not wearing an identity band, the blood specimen must not be taken until one is applied (in-patients only). If at any stage an identity band is removed e.g. for cannulation then it is the responsibility of the person who removed it to re-apply a new identity band immediately.

If patient details are changed / updated on iPIMS, a new identity band must be applied. The Laboratory must be informed.

9.7 Request Form and Specimen Labelling for Blood Transfusion

Requirements for Request Form and Specimen Labelling for Blood Transfusion are detailed in sections 9.7.1 to 9.7.6.

The Electronic Blood Tracking System is the preferred method for labelling samples.

The Blood Transfusion laboratory has a Zero Tolerance policy on specimen/request form amendments. Regardless of whether a sample is a correctly labelled handwritten sample or has an EBTS label, if there is also an addressograph / sample label (full or partial) or the remnants of labels present on the sample bottle, the sample is rejected.
If the date and time on the EBTS labels do not match on the sample and request form, then the sample is rejected.
If the EBTS label on the sample has been placed over another EBTS label already on the sample with a different date and time, then the sample is rejected.

For further details on Request Form and Specimen Labelling for Blood Transfusion, refer to: Haemovigilance procedure P/BT/HV/013 titled 'Completion of Blood Transfusion Request form and Labelling of a Blood Transfusion sample'.

9.7.1 Completing Request Forms for Blood Transfusion for:
a) Group and Antibody Screen
b) Group, Screen & X-match
c) **Requests for Blood, Blood Components and Products**

An Addressograph / EBTS label is permitted on the patient demographic section of the request form.

The Request form **must** contain the following information:

- Unique patient identification number
- Patient's surname
- Patient's forename
- Date of Birth
- Patients Gender
- Ward (if not available on sample)
- The test required
- Any special requirements where applicable must be indicated
- The date, time and name of the person who took the specimen with a contact number (if applicable).

The Request form **should** contain the following information:

- Patient's address
- Consultant's name
- Clinical details
- Reason for Transfusion
- Previous Blood Group (if known)
- Previous Transfusion History, Obstetric History, known Red Cell antibodies or any adverse reactions.
- The number and type of blood components/products required
- Time /Date test is required should be recorded

The only exceptions to the above are:

In an **Emergency situation** (identified patient) the **MINIMUM** information that must be on the transfusion request form is:

- Unique patient identification number
- Patient's surname
- Patient's forename
- Patients DOB

The request form must also have:

- The date, time and name of the person who took the specimen with a contact number (if applicable).

For the **Unconscious/Unidentified** patient*, the minimum information necessary on the request form is:

- Unique patient identification number
- Gender of the patient.

The request form must also have:

- The date, time and name of the person who took the specimen with a contact number (if applicable).

*NOTE If iPIMS is used to register the Unconscious/Unidentified patient, EBTS can then be used for sample/form labelling.

For the unconscious patient, refer to Hospital Policy, HMP014 The Identification and Labelling of Patients and Deceased Persons at the Midland Regional Hospital Portlaoise.

9.7.2 Labelling Specimens for Blood Transfusion for:
a) Group and Antibody Screen
b) Group, Screen & X-match
c) Requests for Blood, Blood Components and Products

Addressograph/Sample labels are **not** permitted on transfusion specimens.

The Electronic Blood Tracking System is the preferred method for labelling samples.
Specimen bottles must never be labelled in advance of sampling.
Transfusion Specimens must be labelled at the patient's bedside.

The specimen label **must** contain the following information:

- Unique patient identification number.
- Patient's surname.
- Patient's forename.
- Date of Birth.
- Date specimen taken.
- Time specimen taken (if not on request form).
- Ward (if not on request form)
- Sampler name.

The only exceptions to the above are:

In an **Emergency situation** (identified patient) the **MINIMUM** information that must be on the transfusion specimen is:

- Unique patient identification number
- Patient's surname
- Patient's forename
- Patients DOB
- Sampler name

For the **Unconscious/Unidentified** patient*, the minimum information necessary on the specimen is:

- Unique patient identification number
- Gender of the patient.
- Sampler name

*NOTE If iPIMS is used to register the Unconscious/Unidentified patient, EBTS can then be used for sample/form labelling.
For the unconscious patient, refer to Hospital Policy, HMP014 The Identification and Labelling of Patients and Deceased Persons at the Midland Regional Hospital Portlaoise.

For the unconscious/unidentified patient: as soon as the patient is identified and stable the Blood Transfusion Laboratory must be informed and a properly labelled Transfusion specimen and request form forwarded.

9.7.3 Completing Request Forms for Cord Blood testing

The Electronic Blood Tracking System is the preferred method for labelling samples.

An Addressograph / EBTS label is permitted on the patient demographic section of the request form.

The request form **must** contain the following information:

- Unique patient identification number
- 'Baby of' or 'Twinone of' or 'Twintwo of'
- Mother's surname.
- Mother's forename.
- Baby's Date of Birth
- Baby's Gender
- Ward (if not available on specimen)
- The date, time and name of the person who took the specimen with a contact number (if applicable).

The request form **should** contain the following information:

- Maternal Blood Group
- Yellow Cord Blood sticker
- Mother's address.
- Consultant's name
- The test required should be clearly marked
- Clinical details

NOTE:
Twins **must always** be booked into the iPIMs system as 'Twin-one' or 'Twin-two' ie all one word. Staff in Maternity are trained as such.
iPIMs can NOT accept more than 2 spaces in forename details (same applies for surname details).
Failure to register Twins as above will cause the mother's forename to be deleted off the EBTS labels. These will be rejected in the Laboratory as 'Twin one of' only appears for the forename.

9.7.4 Labelling Specimens for Cord Blood testing

Addressograph / Sample labels are **not** permitted on specimens.

The Electronic Blood Tracking System is the preferred method for labelling samples. (See note in 9.7.3)

The Specimen label **must** contain the following information:

- Unique patient identification number
- 'Baby of' or 'Twin-one of' or 'Twin-two of'
- Mother's surname
- Mother's forename
- Baby's Date of Birth
- Date specimen taken
- Signature of sampler

The Specimen label **should** contain the following information:

- Ward
- Mother's address.
- Yellow Cord Blood sticker
- Time specimen taken

9.7.5 Completing Request Forms for Group & Coombs/DAT testing

The Electronic Blood Tracking System is the preferred method for labelling samples. (See note in 9.7.3)

Addressograph / EBTS labels are permitted on the request form

The request form **must** contain the following information:

- Unique patient identification number
- 'Baby of' or 'Twin-one of' or 'Twin-two of' with Mother's forename and surname

OR

- Patient's Forename and Surname
- Patient's Date of Birth
- Patient's Gender
- Ward (if not available on specimen)
- The date, time and name of the person who took the specimen with a contact number (if applicable).

The request form **should** contain the following information:

- Maternal Blood Group (if applicable)
- Patient's address
- Consultant's name
- The test required should be clearly marked
- Clinical details

9.7.6 Labelling Specimens for Group & Coombs/DAT testing

The Electronic Blood Tracking System is the preferred method for labelling samples. (See note in 9.7.3)

Addressograph / Sample labels are **not** permitted on specimens.

The Specimen label **must** contain the following information:

- Unique patient identification number
- 'Baby of' or 'Twin-one of' or 'Twin-two of' with mother's forename and surname

OR

- Patient's Forename and Surname
- Patient's Date of Birth
- Date specimen taken
- Signature of sampler

The Specimen label **should** contain the following information:

- Ward
- Patient's address.
- Time specimen taken

9.8 Blood Transfusion Specimen and Request Form Amendment/Rejection Policy

Incorrectly labelled specimen bottles/request forms ***will not*** be processed by the laboratory.

The Blood Transfusion laboratory has a Zero Tolerance policy on specimen/request form amendments.

The Blood Transfusion Lab will contact the person who took the specimen or a member of the team to inform them of the rejection and to request a repeat specimen and request form if required. A report outlining the reason for rejection will be sent to the requesting area.

9.9 Requests for additional products

A blood transfusion specimen and request form is required for the ordering of blood, blood components and products.

If a transfusion specimen and request form is already in the laboratory:

- Check with the laboratory that the request is still valid (72 hours) and a new specimen and request form are not required.
- Additional requests for blood, blood components and products may be telephoned to the Blood Transfusion Laboratory but **must be** verified in writing by completing the A4 request form titled 'Order form for additional Blood, Blood Components and Products' and forwarding it to the laboratory.

9.10 Blood Group only testing (from GPs and outpatients)

The Blood Transfusion Laboratory offers a limited **Blood Group only** Testing

The Portlaoise Transfusion Request Form **must** be used.

This specimen and request form **will never** be used for Transfusion purposes.

The Laboratory must be contacted prior to requesting this service.

9.10.1 Completing Request Forms for Group only testing

Addressograph labels are permitted on the request form only.

Complete all sections of the transfusion request form in full in legible handwriting.

The Request form **must** contain the following information:

- Unique patient identification number (if available)
- Patient's surname
- Patient's forename
- Date of Birth
- Patient's Gender
- Patient's Address if no patient identification number
- 'Blood Group Only' recorded on form
- Ward (if applicable)
- Consultant's/ Clinician's name
- Clinical details
- The date, time and the signature of the person who took the specimen with a contact number if applicable

9.10.2 Labelling Specimens for Group Only testing

Addressograph/Sample labels are **not** permitted on Transfusion specimens.

Specimen bottles must never be labelled in advance of sampling.

Specimen bottles must be accurately and completely labelled before leaving the patient

Complete all sections of the specimen bottle label using a ball point pen.

The specimen label **must** contain the following information:

- Unique patient identification number (if available)
- Patient's surname
- Patient's forename
- Date of Birth
- Patient's address if no patient identification number
- Ward (if applicable)
- Time specimen taken.
- Date specimen taken.
- Signature of sampler.

9.11 Antenatal Testing

Routine Antenatal Group and Antibody Screen specimens are tested at MRH Mullingar. The Mullingar Antenatal request form **must** be used.
The request form and specimen should be fully completed.
However in the case of an emergency, e.g. Unbooked delivery or E.D.D of **< 7 days,** the Blood Group and Antibody Screen will be performed at Portlaoise Transfusion Laboratory if requested on a Portlaoise Blood Transfusion request form. Refer to sections 9.7.1 and 9.7.2 for Request Form and Specimen labelling requirements.

Completing Request Forms for Antenatal Testing in Mullingar (Form M/BT/215):

An Addressograph label is permitted on the patient demographic section of the request form.

The Request form **must** contain the following information:

- Unique patient identification number*
- Patient's surname
- Patient's forename
- Date of Birth
- Patients Gender
- The date, time and name of the person who took the specimen
- If Anti D given in the last 6 months and date of administration

*For partners (only) of antenatal patients with antibodies, the partners address MUST be used as the third identifier instead of a chart number.

The Request form **should** contain the following information:

- Patient's address
- Consultant's name
- Ward
- Test required
- Clinical details
- Expected Delivery Date (if known)
- Previous Transfusion History, Obstetric History, known Red Cell antibodies or any adverse reactions.
- Signature of requestor

Labelling Specimens Antenatal Testing in Mullingar:

Addressograph/Sample labels are **not** permitted on transfusion specimens.

Specimen bottles must never be labelled in advance of sampling.
Transfusion Specimens must be labelled at the patient's bedside.

The specimen label **must** contain the following information:

- Unique patient identification number *
- Patient's surname.
- Patient's forename.
- Date of Birth.
- Date specimen taken.
- Time specimen taken.
- Sampler name.

*For partners (only) of antenatal patients with antibodies, the partners address MUST be used as the third identifier instead of a chart number.

9.12 Indications for Cytomegalovirus (CMV) Negative and Irradiated Blood Components

Refer to Haemovigilance Guideline P/BT/HV/011 titled 'Guideline for the use of Cytomegalovirus (CMV) Negative and Irradiated Blood Components' for:
1) Indications for Cytomegalovirus (CMV) Negative Blood Components.
2) Indications for Irradiated Blood Components.

9.13 Red Cells General Information

Compatibility Tables
For Compatibility Tables for administration of Red Cells, refer to guideline P/BT/HV/006 titled 'The Administration of Blood Components and Products'

Indications for Red Cells
No single criterion can be identified as a "trigger for transfusion" as there is no readily available indicator of critical tissue oxygenation.

Complications of Red Cell Transfusion
For complications of red cell transfusion refer to guideline P/BT/HV/005 titled 'Management of Adverse Transfusion Reactions and Events'

Optimal Timing of Transfusion
Routine Transfusion should be performed during the routine day wherever possible as there are more nursing and medical staff on duty and the patient is more alert.

Maximum Blood Ordering Schedule
A poster format of the Maximum Blood Ordering Schedule (MBOS) for red cells is displayed in those clinical areas where routine surgery workup is performed.

9.13.1 Routine Crossmatching

Please send request at least 24 hours before blood may be required for routine transfusions and for theatre work-up if possible. This will give sufficient time to ensure blood is available for patients who have irregular antibodies.

Blood 'Group & Screen' specimens for elective surgery must arrive in the lab before 15:30 the previous day. Routine specimens arriving after 15:30 will NOT be processed until the following day.

Cross– matched blood will be made available for the time and date given on the request form, unless the Blood Transfusion Department is informed otherwise.

Blood is held for up to 48 hours only after Crossmatching.

9.13.2 Specimen and Request Form timing requirements

Transfusion or pregnancy may stimulate the production of antibodies. To ensure the specimen used for Group, Antibody Screening and Compatibility testing is representative of a patient's current immune status, serological testing should be performed using blood collected no more than 3 days in advance of the actual transfusion.

All patients need a new request every 72 hours*.

The 72 hours is calculated from the time the specimen was taken.

***Exceptions:**

- May be made in the case of a Placenta Praevia in-patient who is repeatedly sampled. A 7 day interval may be approved by contacting the Consultant Haematologist.
- Babies <1 year old *may* have their requests extended to 120 days at the discretion of the Chief/Senior Medical Scientist in Blood Transfusion as it is based on test results etc.

Massive Transfusion

Refer to table for Acute Massive Blood Loss: Template Guideline for use @ MRH Portlaoise for information on Massive Transfusion Guidelines.
Refer to Massive Transfusion Protocol (MTP) Adult only.
It is recommended to send a new Transfusion specimen and Request form 24 hours after the start of a massive transfusion.

9.13.3 Emergency Crossmatching and the use of Emergency Stock O Rhesus (D) Negative Red Cells

Please inform the laboratory of urgent or emergency cross-match requests by telephone and liaise with Blood Transfusion Medical Scientific staff for blood, blood component and product requirements during the course of the emergency.

Crossmatched blood may be made available in approximately **45 minutes** in an emergency if no irregular red cell antibodies are present.

The Blood Transfusion Laboratory must be contacted as soon as possible if you need to use uncrossmatched Red Cells.

A specimen should be taken from the patient prior to the transfusion of any emergency units.

Uncrossmatched Emergency O Rh (D) Negative (Flying Squad) units are available if necessary.
It is the responsibility of the Doctor to request uncrossmatched Red Cells. A written request is required.

Uncrossmatched, group specific blood is available for issue if the patient's Blood Group has been determined on a valid sample already in the Laboratory. Uncrossmatched, group specific blood should be issued when possible to save the O Negative Flying Squad stock.

There is also an uncrossmatched unit of O Rh (D) negative red cells for emergency transfusion of neonate and paediatric patients < 1 year old.

Uncrossmatched units will be issued with labels and compatibility reports stating **"Uncrossmatched blood at request of Medical Doctor".**

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

Refer to guideline P/BT/HV/014 titled 'A guideline for the use of Blood, Blood Components and Products in the management of a massive haemorrhage'.

9.14 Transfer of Red Cells

Where red cells need to be transferred with the patient **please contact the Blood Transfusion laboratory first** so red cells can be appropriately packed in a transport box and the documentation prepared. Please give at least 15 minutes notice to the blood transfusion laboratory where possible.

Red cells **MUST** also be packed in a transport box if (when time allows)
1) > 2 units are taken from the laboratory at the same time for the same patient.
2) Units are required on standby in the clinical area.

If blood components/products other than red cells need to be transferred, they are transported in a clean container. They must not be placed in the BC15 with the red cells which have been prepared.

Platelets and Products such as Plasma and Coagulation Factors must be administered in the stated time frame.

9.15 Platelets

For clinical advice contact the Consultant Haematologist(s).

Compatibility tables
For Compatibility Tables for administration of platelets, refer to guideline titled '*The Administration of Blood Components and Products'.*

Ordering and Issue of Platelets
Platelets are not kept in stock and need to be ordered from the Irish Blood Transfusion Service (IBTS). Requests for platelets must be sent through the laboratory in MRH Portlaoise.

A blood transfusion specimen and request form is required to determine the patient's blood group.

For Oncology / Haematology shared care children, Apheresis platelets are the first choice to limit donor exposure.

For Oncology / Haematology shared care children with a history of previous reactions to platelets, please follow patient specific protocol in their healthcare records. These patients may require pooled in additive solution (PAS) platelets. This MUST be ordered on the request form.

One pack of platelets (not in mls) is the standard order.

Allow a minimum of 3 hours turnaround time for transportation and issue.
Platelets should be transfused immediately as they need to be transfused within 6 hours. Check compatibility report for time of expiry.

Platelets are issued ABO and Rhesus compatible when available.

If Rhesus (D) positive platelets are given to a female of child bearing potential who is Rh (D) negative, this must be discussed with a Consultant Haematologist as the patient may require Anti-D Immunoglobulin.

Dosage
Only <u>one unit of platelets (1 dose)</u> may be ordered at a time for adults, paediatrics and neonates (more may be required for active bleeding).
Contact the Consultant Haematologist(s) for advice if more than one unit (1 dose) of platelets is required. Standard treatment for an adult is "1 adult dose" in 24 hours which should raise the platelet count by 20 X 10^9/ L. Failure of the platelet count to rise to/above the target should be discussed with the Consultant Haematologist.

Children < 20 kgs dose = (10-20 mls/kg). For shared care with CHI Crumlin (see "Shared Care" manual).

In the event of a massive haemorrhage, you may need to use platelets before laboratory results are available. However it is important to take the FBC beforehand as this will serve as a baseline.

A Platelet count, (30-60 minutes post infusion to assess the effectiveness of the treatment) is recommended, especially if the patient's responsiveness to platelet transfusions is unknown.

Complications of Platelet Transfusions

Refer to P/BT/HV/005 titled 'Management of Adverse Transfusion Reactions and Events'

9.16 Plasma

For clinical advice contact the Consultant Haematologist(s).

Compatibility tables
For Compatibility Tables for administration of plasma, refer to guideline titled *'The Administration of Blood Components and Products'.*

Ordering and Issue of Plasma
Plasma is available as Group O, A, B and AB LG-Octaplas.

The objective of a plasma transfusion is to replace coagulation factors where there is evidence of critical deficiencies.

A Group and Antibody Screen specimen and request form must be sent to the Blood Transfusion department.

The laboratory should be notified at least 30 minutes in advance as these units must be thawed (2 units thawed at a time).
Allow a minimum of 40 mins turnaround time for thawing and issue of 2-4 units of plasma.

For indications, ordering and complications of Plasma refer to guideline titled 'The Administration of Blood Components and Products'.

Currently Fresh Frozen Plasma (FFP) is not routinely available.
Octaplas is the replacement product for FFP.

Dosage
The dose of plasma is determined by the clinical condition of the patient and the underlying disease. 12-15 mls/kg is a generally accepted starting dose.

A unit of plasma (200 mls) can be transfused to an uncompromised adult over 30 minutes.

However for an elderly patient, very small and /or cardiac or respiratory compromised patients, the infusion rates should not exceed 2-4 mls/kg per hour.

Complications of Plasma Transfusion
Refer to P/BT/HV/005 titled 'Management of Adverse Transfusion Reactions and Events'.

9.17 Administration of Red Blood Cells, Plasma and Platelets

For detailed information refer to Haemovigilance Guideline P/BT/HV/006 titled 'The Administration of Blood Components and Products'. Red Blood Cells, Plasma and Platelets must be administered through a 170-200 micron filter).

The administration set is changed after every two units or after every six hours whichever comes first, and if changing to a different blood component/blood product.

Red cells, plasma and Platelets must never be mixed in the same giving set.

If the cannula becomes tissued, it must be re-sited and the transfusion restarted within 30 minutes, otherwise the unit is discarded.

Red Cell Administration
Adult Patient: an individual unit of red cells can be completed in approximately 2 hours in an uncompromised patient or at a rate of 2-4mls/kg/hour.
The length of transfusion of one unit should never exceed four hours due to the risk of bacterial proliferation.
Note: Compromised patients should be transfused slowly and closely observed. Restriction of transfusion to one unit of RCC in each 12 hour period should be considered.

Paediatric patient: Refer to local guidelines.

Platelet Administration
Each dose of platelets should be transfused over a period of 30–60 minutes through a blood giving set.

Administration of Plasma
After thawing, plasma **must** be transfused **within the time period stated on the compatibility report**.

Red Cells, Plasma and Platelets should never be transfused using the same administration set.
Drugs must never be added to blood components/products.

On completion of the unit: There is no need to flush any remaining component/ product in the administration set, however if needs be NaCL is the solution to be used.

For the return of unused units refer to section 9.20.1
The appropriate laboratory tests e.g. PT/ INR, and APPT should be carried out to assess the effectiveness of treatment. Please send Coagulation samples to the laboratory, within 30 minutes of completion of treatment.

9.18 Cryoprecipitate

Cryoprecipitate is no longer available; **Fibrinogen** is now considered the product of choice. Refer to section 9.19 for the use of Fibrinogen.

9.19 Coagulation Factor Concentrates

The Consultant Haematologist(s) **must always** be contacted for advice and dosage prior to ordering Coagulation Factor Concentrates from the Blood Transfusion laboratory.

For dosage and monitoring of response, reconstitution, method of administration, complications and contra-indications of Coagulation Factor Concentrates, refer to product insert and guideline P/BT/HV/007 titled 'The Use of Factor Concentrates'.

Ordering and Issue of Coagulation Factor Concentrates

There is no requirement to send a blood transfusion specimen as no group is required for selecting coagulation factors.

A transfusion request form must be completed for the initial written request.

A request for Coagulation factors may also be received on a valid Blood Transfusion request already in the laboratory. An 'Order form for additional Blood, Blood Components or Products' form must be completed and sent to the Laboratory.

Table: Coagulation Factor Concentrates available from the Blood Transfusion Department and their proposed use

Coagulation Factor	Proposed Use
Human Prothrombin Complex * (Factors II,VII,IX,X) e.g. Octaplex	Warfarin overdose with bleeding Peri operative prophylaxis Congenital deficiencies of factors II, VII, IX or X
Recombinant Coagulation Factor IX (e.g. Alprolix)	Treatment of Haemophilia B
Recombinant Coagulation Factor VIII (e.g. Altuvoct)	Treatment of Haemophilia A
Recombinant Coagulation Factor VIIa (Activated) (e.g.NovoSeven)	Haemophilia with inhibitors. Glanzmann's Thrombasthenia Inherited Factor VII deficiency May also have a role in the control of severe bleeding.
Fibrinogen (eg Fibryga)	Hypofibrinogenaemia e.g. massive transfusion resulting in haemodilution
Intermediate Purity Factor VIII (eg Wilate)	Von Willebrands disease bleeding

*** Human Prothrombin Complex** *(e.g Octaplex) is currently the product of choice for the reversal of the effects of Warfarin.*

9.19.1 Recombinant Coagulation Factor VIII (e.g. Altuvoct) and Recombinant Coagulation Factor IX (e.g.Alprolix)

A Consultant Haematologist must be contacted in the event of a haemophilia patient attending hospital in an emergency situation. The Haematologist will advise you on the relevant dosage of factor concentrate for your patient.
All haemophilia patients that are known to us in the region are registered with the National Centre @ CHI Crumlin (children) and @ the National Centre for Hereditary Coagulation Disorders at St. James's Hospital (adults) where you may contact the Haematology Registrar on call

9.19.2Human Prothrombin Complex e.g. Octaplex

Human Prothrombin Complex (Octaplex) is licensed for use in the Republic of Ireland. Refer to Coagulation Factor Concentrates table section 9.19.

For further information on Human Prothrombin Complex (Octaplex), refer to product insert and P/BT/HV/007 titled 'The use of Factor Concentrates'.
Note: - For reversal of Warfarin in non-emergency situations, administration of Vitamin K and/or reduction/discontinuation of Warfarin may be sufficient. The Consultant Haematologist may be contacted for advice.

Table: Recommendations for Management of Bleeding & Excessive Anticoagulation

<table>
<tr><td>INR * 3– 6 (target INR 2.5)
INR 4–6 (target INR 3.5)
No bleeding or minor bleeding</td><td colspan="2">1. Reduce or stop Warfarin dose
2. Restart Warfarin when INR <5.0</td></tr>
<tr><td>INR 6 – 8;
No bleeding or minor bleeding</td><td colspan="2">1. Stop Warfarin
2. Restart Warfarin when INR < 5.0
3. If other risk factors** for bleeding give 0.5 – 1.0mg of Vitamin K (oral)</td></tr>
<tr><td>INR >8.0, no bleeding or minor bleeding.</td><td colspan="2">1. Stop Warfarin
2. Restart when INR is <5.0
3. Give 1 – 2 mg of Vitamin K (IV or oral). Recheck INR after 6 and 12 hours.</td></tr>
<tr><td rowspan="5">Life Threatening bleeding/ Emergency Surgery</td><td colspan="2">1. Stop Warfarin
2. Consult Haematology Team
3. Give 5-10 mg of Vitamin K, IV
4. Give Human Prothrombin Complex (Octaplex) 25 – 50 iu/kg or if contraindicated SD Plasma 12- 15 mls/kg.</td></tr>
<tr><td>Patient's INR</td><td>Recommended dose of Human Prothrombin Complex (Octaplex) based on F IX content</td></tr>
<tr><td>INR 2.0 – 3.9</td><td>25iu/kg</td></tr>
<tr><td>INR 4.0 – 6.0</td><td>35iu/kg</td></tr>
<tr><td>INR > 6</td><td>50iu/kg</td></tr>
</table>

Notes:
* INR = International Normalised Ratio
** Risk Factors are: Age of patient > 70 and/or previous history of bleeding
Identify cause of excessive anticoagulation & in general start Warfarin at a lower dose.

9.19.3 Recombinant Coagulation Factor VIIa (Activated) eg Novoseven

Recombinant Coagulation Factor VIIa (Activated) eg Novoseven is licensed for use in the Republic of Ireland. Refer to Coagulation Factors table section 9.19.

Possible Off-Licensed Use
Recombinant Coagulation Factor VIIa may be used to correct coagulopathy associated with severe bleeding where other treatments have failed.
Refer to guideline P/BT/HV/014 titled '*Guideline for the Management of an Actively Bleeding Patient in a Life Threating Haemorrhage'*. If, despite all the usual measures a patient is still bleeding, Recombinant Coagulation Factor VIIa (Activated) can be life saving.

As this product is not from blood donors, it may be acceptable to Jehovah Witnesses in a variety of coagulopathies that would usually be treated with blood products.

The use of this product in reversal of Warfarin overdose has been described but other than in Jehovah Witnesses, Human Prothrombin Complex (Octaplex) is recommended.

9.19.4 Intermediate Purity Factor VIII (eg Wilate)

This is indicated for patients with severe Von Willebrand's Disease (vWD) with major haemorrhage.

Most patients with VWD can be managed with antifibrinolytic agents and/or Desmopressin (DDAVP).

9.19.5 Fibrinogen (e.g.Fibryga)

This is indicated for patients with Hypofibrinogenaemia e.g. massive transfusion resulting in haemodilution.

9.19.6 Laboratory tests to monitor response to Coagulation Factors

Table: Appropriate laboratory tests for monitoring response to Coagulation Factors

Product	Coagulation Test	Comments
Human Prothrombin Complex (e.g. Octaplex)	PT	1 dose (based on patient's weight) should correct INR of patient's on Warfarin to near normal. Should be checked at 1 hour and 6 hours post infusion.
Recombinant Coagulation Factor VIIa (Activated) (e.g.Novoseven)	No Specific Measurement	Monitor clinically and as per massive blood loss i.e. PT/APTT/Fib/Plt/Hb.
Intermediate Purity Factor VIII (e.g. Wilate)	VIIIc/ WFAg/ Ristocetin co-factor	Send Coagulation sample to lab in Portlaoise to send to SJH
Recombinant Coagulation Factor VIII (e.g. Altuvoct)	VIII APTT in an emergency	1 dose should correct to normal. Coagulation sample can be sent to SJH for Factor VIII levels.
Recombinant Coagulation Factor IX (e.g. Alprolix)	IX APTT in an emergency	1 dose should correct to normal. Send Coagulation sample to the Lab in Portlaoise to send to SJH for Factor IX levels.
Fibrinogen (e.g. Fibryga)	Fibrinogen	1 g will increase plasma Fibrinogen level by 0.25g/L. Usual dose 2-4 gm

9.20 Traceability of units for Blood Transfusion

All units issued from the laboratory must be definitively fated. Units which are commenced must be clearly identifiable from the supporting documentation. Therefore the administrators must:

1. Record their unique identification to the prescription sheet

2. Use the Electronic Blood Track System to fate units where appropriate
   or
   detach and complete the traceability label on each pack when the EBTS is not used for fating.

3. Complete the Traceability label when the blood track is not used by recording 1 of the administrators:
   - Signature
   - Printed Name
   - Date
   - Time

4. Return the Traceability label to the Laboratory in red envelope provided (or any envelope addressed to the Blood Transfusion Laboratory) using the pneumatic tube chute system.

This ensures 100% traceability and fating of each blood unit transfused as required by the EU Directive 2002/98/EC.

9.20.1 Unused Blood/Blood Components and Products

Any unused Blood/Blood Components and Products must be returned to the Laboratory as soon as possible and within 30 minutes to avoid Clinical wastage. Inform the Blood Transfusion (BT) Department.

Un-spiked units out of the BT Issue fridge for <30 minutes, if not for immediate use, can be returned to the fridge for later usage to avoid wastage.

Un-spiked units out of the BT fridge for >30 minutes, can be held in a clean area in the clinical area but must be completely transfused to the patient within 4.5 hours from the time they were originally removed from the BT fridge. After 4.5 hours any unused RCC units can be returned to the BT lab and fated as NOT transfused on the Traceability label by clinical staff. Inform the BT Department as these units need to be fated as 'Clinical Wastage' and returned as such to the IBTS.

Units, which have been temporarily disconnected from the patient, must be restarted within 30 minutes or discontinued completely and discarded. Refer to Haemovigilance guideline P/BT/HV/006 or contact the clinical team. If additional units are required, contact the BT Laboratory.

Spiked units must only ever be returned to the BT laboratory if it is thought they have adversely affected the patient and a reaction is suspected.

9.20 Albumin

Albumin is available from the Pharmacy in MRH Portlaoise.

Refer to Product insert for Complications and Contraindication of Albumin Transfusions

9.22 Anti-D Immunoglobulin

Anti-D is available from the Laboratory for:

Termination of Pregnancy
Antenatal sensitising events
Routine Antenatal Anti D Prophylaxis
Post-natal administration

For Indications, Ordering, Prescribing and Administration and Anti D:
Refer to obstetric guideline PHOG006 titled 'Guideline for the Administration of Anti-D Immunoglobulin (including Routine Antenatal Anti D Prophylaxis – RAADP)'.

For collection of Anti D from the Laboratory:
Refer to Haemovigilance guidelines
P/BT/HV/009 titled 'The collection, return and documentation of blood components / products to / from the laboratory in MRHP'.

9.23 Suspected Transfusion Reactions

A reaction can occur at any stage of a transfusion. For Management of an Acute Transfusion Reaction refer to P/BT/HV/005 titled 'Management of Adverse Transfusion Reactions and Events'.

In the case of a **suspected transfusion reaction** the medical staff should contact the Consultant Haematologist(s) or Haematology Registrar for advice. They can be contacted through the switch board at the Midland Regional Hospital at Tullamore (*51920 or 057 9321501).

The laboratory should only be contacted when the Consultant Haematologist(s)/Registrar decides that a transfusion reaction needs to be **investigated and what tests are required**. The appropriate specimens (and relevant request forms) are selected from the list below, **depending on the type of Transfusion Reaction suspected**.

The reporting of Serious Adverse Reactions and Events is a mandatory requirement under the EU Directive 2002/98/EC.

In the event of a suspected Transfusion Reaction it is the Clinical Team's responsibility to record any reaction, and the management of that reaction in the Patient's healthcare records.

For Symptoms and Signs, Causes, Management and Investigations required for Acute and Delayed Transfusion reactions refer to Guideline P/BT/HV/005 titled 'Management of Adverse Reactions and Events'. Available on Hospital QPulse and search transfusion on the Hospital Med App.

Further information or clarification may be obtained from the Consultant Haematologist and/or Laboratory Medical Scientist and/or TSO.

Contact the Blood Transfusion Laboratory or the 'on call' Medical Scientist on duty if you suspect a transfusion reaction due to:

- Bacterial contamination of the blood component/product
- Transfusion Related Lung Injury (TRALI)

Rapid Alert to the Irish Blood Transfusion Service is necessary.

Selection of Tests which may be Required (depends on type of reaction suspected)

- The suspect unit with all lines attached and administration set must be secured in the off position and sealed in a rigid container for return to Blood Transfusion Laboratory.
- 7.5 ml EDTA SARSTEDT Red bottle for Blood Transfusion specimen for repeat ABO, Rh, antibody screen & X-match and Direct Antiglobulin test (DAT).

  Complete a **new** transfusion request form.
- 2.7 ml whole blood in EDTA, SARSTEDT Red bottle for repeat FBC and Blood film.
- 3 ml citrated plasma in a SARSTEDT Green bottle for coagulation screening.
- 4.9ml Serum in SARSTEDT Brown gel bottle for U&E, LFT and LDH.
- Blood Cultures on patient (aerobic & anaerobic).
- Urine Specimen-first voided specimen to check for Haemolysis, Haemoglobin and Urobilinogen.
- 2 x 4.9ml whole blood in SARSTEDT Brown gel bottle for White Cell Antibodies, Platelet Antibodies, Immunoglobulin testing or Haptoglobins.
- **Repeat** Coagulation, FBC & U&E every 2-4 hours.

Note specimens from children may also be taken into SARSTEDT Paediatric bottles.

9.24 Termination of Pregnancy (TOP)

Medical Termination of Pregnancy (TOP) prior to 7 weeks does NOT require Rhesus Testing or administration of Anti D as the risk of sensitization is negligible.

Termination of Pregnancy >/= 7 weeks requires Blood Group and Antibody Screen Testing prior to administration of Anti D.

Contact the Blood Transfusion Laboratory for sample requirements.

For Indications, Ordering, Prescribing and Administration and Anti D:
Refer to obstetric guideline PHOG006 titled 'Guideline for the Administration of Anti-D Immunoglobulin (including Routine Antenatal Anti D Prophylaxis – RAADP)'.

9.25 Criteria for Phoning Critical Results in Blood Transfusion

It is the Policy of the Blood Transfusion Department not to report patient Blood Groups/DAT results verbally over the phone.
Refer to procedure P/BT/SOP/020 titled 'Procedure for the review and release of verbal, interim and final Blood Transfusion reports to users.

Phone **Critical Alerts for Blood Transfusion** in the following instances.

1. Repeat Sample required for any reason
2. Further information/clinical details required
3. Rejected requests if there is no valid sample in the Lab
4. Blood group anomalies
5. Positive Antibody Screen and Identification of Antibodies +/-Incompatible crossmatches causing a significant delay in testing and issue of reports.
6. Communication in the event of:
   - Critically ill patient
   - Emergency situation
   - Massive transfusion
7. Inability to identify antibodies which require additional samples for referral.
8. When Blood or Blood Products are available in urgent cases only.
9. After serological investigation of a suspected transfusion reaction
10. Antenatal reports including:
    - Anti D Quantitation results if moderate / high risk of HDN
    - Anti C Quantitation results if moderate / high risk of HDN
    - Clinically significant (for HDN) antibodies with a titre of >32 detected
    - Significant titre increases in patients with antibodies likely to cause HDN
    - Clinically significant (for HDN) antibodies in unbooked antenatal patients close to expected delivery date

    There is no requirement to keep phoning titres remaining above 32/or quantitation's with moderate/high risk on repeat testing during the pregnancy.

Note:
*Contact the Consultant Haematologist on duty via switch board at Tullamore Hospital speed dial *51920*

10.0 MICROBIOLOGY

Microbiology Department
Phone 96266 – (057 8696266)

Position	Contact Name	Contact Number	Contact Email
Chief Medical Scientist	Aideen Joyce	057 86 96852	aideen.joyce@hse.ie
Senior Medical Scientist	Iris Brennan	057 86 96266	irisc.brennan@hse.ie
Surveillance Scientist	Gordon Lalor	057 86 96847	gordon.lalor@hse.ie
Infection Control Nurses based in MRHP	Anne-Marie Hogan Sharon O'Loughlin Celine Muthukumaran (Maternity only)	*51917 *51163 *51612 (057 86 92711) office number	
Infection Control Nurses based in the Community CH08			
Area Medical Officer (Management of Notifiable Diseases)		057 9359891	PublicHealth.AreaB@hse.ie
Consultant Microbiologist	Dr Pankaj Lal	*51205 (0044 7914783231)	

The Microbiology Department provides a routine service to the hospital and to general practitioners. In addition a referral service for more specialised tests is provided.
An on call service is provided to the hospital only for processing of non-deferrable/urgent test requests. There is no routine service provided on Saturday/Sunday/Bank Holidays and this may result in a delay in the final report.

10.1 Antibiotic Service

The Microbiology Department offers a clinical service, both for diagnosis and management advice. The Consultant Microbiologist may be contacted on office direct dial 58349 or mobile speed dial *51205 (0044 7914783231).
An Antimicrobial Pharmacist is based on site and may be contacted on Bleep 143.

When prescribing Antibiotics the generic name should be used. No more than two antibiotics should be used except in exceptional circumstances.
Refer to the HSE Guidelines for the use of Antibiotics**.**

10.2 Infection Control and Surveillance

Infection Control for the Laois area in the Midland Health Board includes:
- 3 Infection Prevention and Control Nurses (Clinical Nurse Manager CNM11) based in MRH Portlaoise.
- 3 Infection Prevention and Control Nurse (Clinical Nurse Manager CNM11) based in the Community Catchment 8
- Regional Assistant Director of Nursing (ADON).

The Infection Control Team are available for education and advice in the acute hospitals, district hospitals and the Community.

A Surveillance Scientist co-ordinates the Microbiology Surveillance Programme for Notifiable Diseases for MRH Portlaoise. All notifiable diseases are reported to the Health Protection Surveillance Centre (HPSC).

The Area Medical Officer co-ordinates the Management of Notifiable Diseases.

All contact numbers are detailed in table above.

10.3 Specimen Requirements

Please ensure bottles/swabs are within their expiry date. Samples sent to the laboratory using expired sample bottles/swabs will be rejected. Refer to Section 10.5 for Microbiology Specimen collection devices in use.

Each laboratory test will be described under the headings described below. Refer to Section 10.6 for details on Microbiology Tests.

- **Test Name -** Full name of the test
- **Test code -** The abbreviated name for test commonly used
- **Laboratory /Department -** Specifies the location where the test is performed
- **Specimen -** The type of specimen required is stated.
- **Volume -** The volume of the required specimen container is stated.
- **Container -** The type of container/additive is stated
- **Colour Code -** The colour code of the container is stated
- **Turnaround time -** Turnaround time is defined as the time from specimen receipt in the Pathology department to the time results are available.
- **Notes/Limitation**
  Comment identifies any further action required when requesting or taking a particular specimen. Special requirements are detailed where necessary including but not limited to:
  - Patient preparation
  - Special timing for collection of specimens
  - Any special handling needs between time of collection and time received by the laboratory (transport requirements, refrigeration, warming, immediate delivery etc)

  NOTE A false negative result may occur if a specimen is improperly collected, transported or handled.
  Transport to the laboratory as soon as possible for correct storage.
  False negative results may also occur if inadequate numbers of organisms are present in the specimen.
    - Please provide relevant clinical details
    - Only swabs sent in suitable transport medium will be processed. Swabs that are sent without the correct transport medium may be dry and will not yield the targeted organisms. Specimens should be transported to the laboratory as soon as possible. Where this is not possible, refrigeration is preferable – 4^{o}C is recommended.

PCR Test Methods

A negative PCR molecular test does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.

- A false negative result may occur if a specimen is improperly collected, transported or handled. False negative results may also occur if inadequate numbers of organisms are present in the specimen.
- This test cannot rule out diseases caused by other bacterial or viral pathogens.
- This test is a qualitative test and does not provide the quantitative value of detected organism present.

Urine/Specimen Collection Device

Faeces/Stool Collection Device

Red CPE Testing Kit

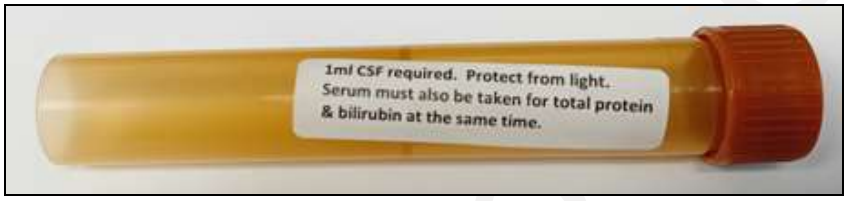
Black Charcoal Swab

Pink Viral Swab

Pertussis Swab

Biocomma Red Swab


Oracle Swab



CSF protect from light Collection Device

CSF Collection Bottles

Cobas Urine Collection for testing Chlamydia/Gonorrhoeae

Cobas Swab Collection for testing Chlamydia/Gonorrhoeae

Aptima Urine Collection for testing Chlamydia/Gonorrhoeae

Aptima Swab Collection for testing Chlamydia/Gonorrhoeae

10.5 Microbiology Tests

Details for Microbiology Tests are listed below in alphabetical order

Blood Cultures

- **Laboratory/Department -** Portlaoise Microbiology

Refer to Infection Prevention Control Guideline IPCR 24 in the clinical area titled 'Procedure for taking Blood Cultures for further information'.

Take samples using aseptic technique into appropriate blood culture bottles (evacuated system).

- **Specimen/Volume/Container**

Patient	Sample Bottles	Minimum Volume
Adult	Aerobic Bottle (Blue) 	10ml Ensure the bottle is correctly filled to the Fill-to-Mark or target fill level
	Anaerobic Bottle (Purple) 	10ml Ensure the bottle is correctly filled to the Fill-to-Mark or target fill level
Paediatric	Paediatric Aerobic (Yellow) 	1-4 ml See Below

Please indicate if Infective Endocarditis (IE) is suspected as incubation is extended for these cases to 10 days.

All blood culture bottles have a fill line – the mark "fill-to" indicates the level when the optimal blood volume of 10ml is reached for adults. The amount of blood collected is an important variable for the detection of micro-organisms in patients with suspected sepsis with the correct blood volume in a blood culture bottle, the detection rate of the pathogens present in small numbers (bacteria, fungi) increases. This feature does not apply to the paediatric blood culture bottle due to the low fill volume and the optimal amount of blood collected from paediatric patients depends on their body weight.

Paediatric / SCBU: BacT/ALERT® PF Plus Yellow
The recommended volume of blood to collect should be based on the weight of the patient (see Table), and an aerobic bottle should be used, unless an anaerobic infection is suspected.

Table 1: Recommendations for Optimal Blood Volume for Peadiatric Blood Cultures based on self-defined age or weight classes	
Adapted from Huber et al. The correct blood volume for paediatric blood cultures: a conundrum? Clin Microbiol Infect.2020;26(2):168-173. Reproduced with permission	
Patient Weight (kg)	Total Blood Volume (ml)
≤2.0	1.0 – 4.5
>2.0 - 5.0	1.0 – 6.0
>5.0 – 10.0	1.5 – 10.0
>10.0 – 20.0	6.0 – 23.0
>20.0 – 30.0	>10.0
Patient Age	Total Blood Volume (ml)
<1yr	>0.5 – 3.0
≥1 – 3y	1.0 – 4.0
>3 – 10y	3.0 – 8.0
>10y	20.0

Table: Recommendations for optimal blood volume for paediatric blood cultures based on self-defined age or weight classes - BLOOD CULTURE A key investigation for diagnosis of bloodstream infections. (Biomerieux)

- **Turnaround Time**

Positive Results: Blood Cultures are monitored continuously during the routine day. Positive blood cultures are phoned including gram stain to the clinical teams within 2 hours of flagging positive. After 17:00 positive blood cultures are phoned to the clinical teams before 11:30 the following day. A written interim report is then issued. Standardised susceptibility testing results and final report will be issued within 24-48 hours where applicable. Reports are released on Ward Enquiry.

Negative Results: Negative reports are issued after 5 days incubation (10 days if Infective Endocarditis infection is suspected). A false negative result may occur if specimen bottles are underfilled. A false positive result may occur if specimen bottles are improperly collected

- **Notes/Limitations**
  - Do not cover or remove the bottle's barcode label as this is scanned as part of the analytical process.
  - Please ensure date and time taken is documented on the request form/sample bottles.
  - Specify collection site.
  - Blood culture bottles must not be refrigerated.
  - Specimens must be sent to the laboratory immediately for incubation at 35ºC - 37ºC.
  - The pneumatic chute may be used to transport blood cultures.
  - Sample should be taken preferably before antimicrobial treatment is started.
  -

Bordetella Pertusis

- **Laboratory/Department-** Crumlin
- **Specimen -** Perinasal Swab Culture or Nasopharyngeal Aspirates
- **Volume –** N/A
- **Container -** Perinasal Swab
- **Colour Code -** Blue Cap Swab
- **Turnaround time -** 5 days
- **Notes/Limitations**

Contact Microbiology Lab ext. 96266 for pertussis swabs if required
Infants - A single nasopharyngeal aspirate or per-nasal swab for culture and PCR testing should be taken at the time of hospital admission or as soon as possible post onset of disease
Over 12 months of age and Adults -A single nasopharyngeal aspirate or per-nasal swab for culture and PCR testing is recommended in the early stages of illness ie within 3 weeks of onset.

Bronchoalveolar Lavage (BAL) Culture and Sensitivity

- **Laboratory/Department –** Portlaoise Microbiology
- **Specimen -** BAL
- **Volume –** Minimum 10mls
- **Container –** Plain Sterile Universal Container
- **Colour Code -** Blue
- **Turnaround time –** 48 – 72 hours
- **Notes/Limitations**
  Please send separate BAL sample for additional external tests eg Legionella, Mycoplasma
  Please hand deliver BAL samples to the Microbiology Lab before 15:00
  Please tighten lids on specimen containers so they do not leak.

C. difficile

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces
- **Volume -** 5 – 10 gm (walnut size)
- **Container -** Blue Capped Universal Container with Spoon
- **Colour Code -** Blue
- **Turnaround time -** 24 – 48 hours
- **Notes/Limitations**
  C. difficile not performed on formed stool. Only diarrhoeal stool samples (Bristol type 5, 6, 7) will be tested for *C. difficile* toxin. Retesting of patients with CDAD is not advised for 4 weeks after initial laboratory diagnosis.
  Antibiotic history must be included. Specimen must be in lab by 15:00 Weekdays and 11:00 Sat/Sun/BH

Cannulae Line Tip Culture

- **Laboratory /Department -** Portlaoise Microbiology
- **Specimen -** Line Tips
- **Length –** 4cm in length approx
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Use Sterile Scissors or Cutter
  Arterial line tips, pig tail drain, tips and urinary catheter tips are rejected

Cerebrospinal Fluid CSF

CSF for Cell Count, Culture and Sensitivity
Please telephone Microbiology in advance
Please schedule CSF specimens during the routine day, where possible and send to the laboratory for testing prior to 4 pm to facilitate processing by Microbiology Department staff.

- **Laboratory /Department -** Portlaoise Microbiology
- **Specimen -** Cerebrospinal Fluid
- **Volume -** Minimum volume of 1.0ml/container is recommended
- **Container -** Plain Sterile Universal Container/CSF Pack Labelled 1, 2, 3
- **Colour Code –** white
- **Turnaround time -** Cell Counts, Glucose and Protein Processed Immediately. Culture requires 48-72 Hours incubation

A CSF specimen should be collected sequentially into **three or more** separate plain sterile universal containers which should be numbered consecutively (e.g 1, 2, and 3)
Additional tests require 4-5 samples. **Tighten CSF caps to ensure samples do not leak.**

Specimens must be labelled with the patient details and be accompanied by a microbiology request form.
CSF specimens must be transported to the laboratory immediately in a sealed plastic bag by hand.
DO NOT USE PNEUMATIC TUBE SYSTEM

Reference Ranges: Normal CSF Values

Leucocytes	Neonates	Less 28 days	0-30 cells x 10^6/L
	Infants	1 to 12 months	0-15 cells x 10^6/L
	Children/Adults	1 year +	0-5 cells x 10^6/L
Erythrocytes	No RBC should be present in normal CSF		

From: UK Standards for Microbiology Investigations 'Investigation of Cerebrospinal Fluid' Issue 6.1 2017

Samples will be forwarded to appropriate External Laboratories for additional testing such as TB, Xantochromia, Oligoclonal Bands etc, where requested (Hospital Only requests)

CSF for Xanthchromia
- **Laboratory /Department –** Beaumont Lab
- **Specimen -** Cerebrospinal Fluid and Serum
- **Volume -** Minimum volume of 1.0ml
- **Container -** Plain Brown Tube for Xanthochromia (available from Microbiology Lab if required)
- **Colour Code -** Brown
- **Turnaround time -** Xanthochromia 1-2 Days. Available Monday to Friday from Beaumont

Xanthchromia test requests are processed Monday to Friday 9.00am to 5.00pm in Beaumount.
A Plain Brown tube for Xanthochromia must be obtained from Microbiology prior to testing.
1 ml of CSF must be tapped directly into a light-protected plain brown tube for Xanthochromia testing and sent to the Laboratory immediately by hand.

Serum Sample for Bilirubin and Total Protein Estimation should be taken at the same time as CSF
- **Notes/Limitations**
  Deliver CSF samples to the Microbiology Department immediately, by hand. DO NOT USE PNEUMATIC TUBE SYSTEM

CSF for Virology
CSF test requests for Virology are processed Monday to Friday in the Virus Reference Laboratory (VRL).
The list of Viral tests required is MANDATORY.
- **Laboratory /Department -** NVRL
- **Specimen -** Cerebrospinal Fluid
- **Volume -** Minimum volume of 0.5ml
- **Container -** Plain Sterile Universal Container/CSF Pack Labelled 1, 2, 3
- **Colour Code -** white
- **Turnaround time -** Cerebrospinal Fluid for Virology 1-2 Days. Available Monday to Friday from NVRL
- **Notes/Limitations**
  List Viruses Required on Request Form. Specimens must be taken to the laboratory IMMEDIATELY by hand. **DO NOT USE PNEUMATIC TUBE SYSTEM**

CSF for Bacterial PCR
CSF for Bacterial PCR are processed Monday to Friday in Irish Meningitis and Sepsis Reference Laboratory (IMSRL), Temple Street. (Hospital Only requests)

- **Laboratory /Department –** Temple Street
- **Specimen -**Cerebrospinal Fluid
- **Volume -** Minimum volume of 0.5ml (higher volume recommended if repeat testing or additional testing is required)
- **Container -** Plain Sterile Universal Container/CSF Pack labelled 1, 2, 3
- **Colour Code -** White
- **Turnaround time -** Bacterial PCR 1-2 Days. Available Monday to Friday from Temple Street
- **Notes/Limitations**
  The list of Bacterial PCR tests required is MANDATORY. MUST USE IMSRL Form (Available from web site) **Patient Address is MANDATORY.** Specimens must be taken to the laboratory IMMEDIATELY by hand. **DO NOT USE PNEUMATIC TUBE SYSTEM**

  Specimen requirements and testing rules are detailed on the back of the request form. Note: Special Test requests will only be performed by the IMSRL Laboratory if specified requirements are met.

CSF Oligoclonal Bands
A serum sample is required in addition to CSF.

- **Laboratory /Department –** St James
- **Specimen –** Serum and CSF
- **Volume -** Minimum volume of 300µL CSF and 4.9ml serum
- **Container –** Brown Serum, Plain Sterile Universal Container/CSF pack labelled 1, 2, 3
- **Colour Code –** Brown for Serum, White for CSF
- **Turnaround time –** 10-14 Days. Available Monday to Friday from St James
- **Notes/Limitations**
  Specimens must be taken to the laboratory IMMEDIATELY by hand. **DO NOT USE PNEUMATIC TUBE SYSTEM**

Chlamydia/Gonorrhoea PCR

- **Laboratory/Department -** NVRL
- **Specimen -** Urine / Swab / Neonatal Eye Swab
- **Volume –** Fill between black lines on urine specimen tube
- **Container -** Aptima Urine Specimen Collection Kit / Aptima Multitest Swab Specimen Collection Kit
- **Colour Code -** White Lid/White Swab
- **Turnaround time -** 1 week
- **Notes/Limitations**
  Follow instructions on pack. Contact NVRL for APTIMA containers
  Aptima Urine Collection Kit
  1. Patient should not have urinated for at least 1 hour prior to sampling
  2. Patient to provide a first-catch urine (20-30mls of initial urine stream) into a urine collection cup
  3. Female patients should NOT cleanse the labial area prior to providing sample
  4. Transfer 2ml of urine into urine specimen transport tube and fill between black lines
  5. Recap urine specimen transport tube tightly

  A negative PCR molecular test for *Chlamydia trachomatis* or *Neisseria gonorrhoeae* does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.

Chlamydia/Gonorrhoea PCR

- **Laboratory/Department -**Mullingar Microbiology
- **Specimen -** Urine / Swab / Neonatal Eye Swab
- **Volume -** Fill between black lines on urine specimen tube
- **Container -** COBAS PCR Urine containers/COBAS Dual Swab
- **Colour Code -** Yellow Lid/Yellow Swab
- **Turnaround time -** 1 week
- **Notes/Limitations**
  Cobas PCR Urine, fill between black lines on the urine specimen tube. Follow instructions on pack. Contact Laboratory for COBAS containers
  A negative PCR molecular test for *Chlamydia trachomatis* or *Neisseria gonorrhoeae* does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.

Covid 19 (SARS-CoV-2) PCR

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Nasopharyngeal Swab
- **Volume -** N/A
- **Container –** Biocomma transport and preservation medium
- **Colour Code -** Red Naso-pharyngeal Swab
- **Turnaround time -** 1 day
- **Notes/Limitations**
  Urgent Samples for same day testing must be received before 23:00 weekdays. SAT/SUN/BH before 13:00
  A negative PCR molecular test for SARS-CoV-2 does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.
  A false negative result may occur if a specimen is improperly collected, transported or handled. False negative results may also occur if inadequate numbers of organisms are present in the specimen.
  This test cannot rule out diseases caused by other bacterial or viral pathogens.
  This test is a qualitative test and does not provide the quantitative value of detected organism present.

CPE Screen PCR – Carbapenemase Producing Enterobacterales

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Rectal Swab
- **Volume -** N/A
- **Container -** A Copan transystem double swab
- **Colour Code -** Red Dual Swab
- **Turnaround time -** 1 day
- **Notes/Limitations**
  Service available Monday to Friday. Samples must be received before 15:00. Samples must be received SAT/SUN/BH before 11:00. A negative PCR molecular test for Carbapenemase-Producing Enterobacterales (CPE) does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.
  Refer to CPE Screening requirements for Adults and Children (NCEC 30)

CPE Screen Culture - Carbapenemase Producing Enterobacterales

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces/ Black Charcoal Rectal Swab
- **Volume -** 5-10gm (walnut size)/N/A
- **Container -** Blue capped universal container with spoon/Black Charcoal Swab
- **Colour Code -** Blue Lid/Black Swab
- **Turnaround time -** 24 – 72 Hours
- **Notes/Limitations**

Cryptosporidium Parasite

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces
- **Volume -** 5-10gm (walnut size)
- **Container -** Blue capped universal container with spoon
- **Colour Code -** Blue Lid
- **Turnaround time -** 28 – 72 Hours
- **Notes/Limitations**

Ear Swab Culture & Sensitivity

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Ear Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black Swab
- **Turnaround time -** 48 – 72 Hours
- **Notes/Limitations**
  Collect specimens before antimicrobial therapy where possible.

Endocervical – as per Swab

- **Laboratory/Department –** Portlaoise Microbiology
- **Specimen –** Endocervical Swab
- **Volume –** N/A
- **Container –** Charcoal Transport Swab
- **Colour Code –** Black Swab
- **Turnaround time –** 48 – 72 hours
- **Notes/Limitations**
  Please refer to Chlamydia/Gonorrhoea PCR section for correct collection device for Chlamydia/Gonorrhoea PCR

Eye Swabs for Culture and Sensitivity

- **Laboratory/Department –** Portlaoise Microbiology
- **Specimen –** Eye Swab
- **Volume –** n/a
- **Container –** Charcoal Transport Swab
- **Colour Code –** Black Swab
- **Turnaround time –** 48 – 72 hours
- **Notes/Limitations –**
  Collect specimens before antimicrobial therapy where possible.
  Separate samples must be collected into appropriate transport media for detection of Chlamydia. Refer to Chlamydia/Gonorrhoea PCR section.

Faecal Occult Blood F.O.B.

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces
- **Volume -** 5 – 10 gm
- **Container -** Blue Capped Universal Container with Spoon
- **Colour Code –** Blue
- **Turnaround time -** 24 hours
- **Notes/Limitations**

Faeces for Culture & Sensitivity

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces
- **Volume -** 5 -10 gm (walnut size) please do not overfill container
- **Container -** Blue Capped Universal Container with Spoon
- **Colour Code –** Blue
- **Turnaround time -** 48 – 72 Hours
- **Notes/Limitations**
  - Stool samples are routinely screened for *Salmonella, Shigella, Verotoxigenic E. coli,* and *Campylobacter*
  - All samples will be screened for Cryptosporidium regardless of request for Ova and Parasites.
  - Rotavirus and Adenovirus will be tested on Faeces from Children <5 years. When requested sample will be cultured for *Yersinia* and *Vibrio* species if clinically indicated. Please provide clinical details and indicate any recent foreign travel. Norovirus testing is performed when requested and if clinically indicated.
  - Request for enteric screen does not include *C. difficile* toxin. This must be requested separately when clinically indicated.
  - It is important to provide details of clinical symptoms and epidemiological settings on request form, the presence and duration of symptoms, recent travel, shellfish ingestion and previous antibiotic therapy.

Fluid Culture & Sensitivity / Aspirates

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen –** Synovial Joint Fluid, Peritoneal Fluid, Ascitic Fluid, Pleural Fluid, Bursa Fluid
- **Volume -** 2-3ml
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 Hours
- **Notes/Limitations**
  Uric Acid Crystals – MRHT Joint Fluids only <24 hours – Final Report 7-9 days
  Collect specimens before antimicrobial therapy where possible

Genital Tract and Associated Specimens

- **Laboratory/Department -** Portlaoise Microbiology
  Specimen – Vaginal, High Vaginal, Low Vaginal, Vulval, Endocervical, Urethral, Penile, Rectal, Labral, Intra-uterine, Contraceptive Device (IUCD)
- Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab - Cobas - Aptima
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Clinical details essential.
  For urethral specimens, patients should not have passed urine for at least one hour.
  Collect specimens before antimicrobial therapy where possible.

Influenza A/B, Respiratory Syncytial Virus (RSV) PCR

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Naso-pharyngeal Swab
- **Volume –** 1ml
- **Container –** Biocomma transport and preservation medium
- **Colour Code -** Red Nasopharyngeal Swab
- **Turnaround time -** 1 day
- **Notes/Limitations**
  Service available during peak flu season. Samples must be received before 23:00 weekdays. SAT/SUN/BH before 13:00
  A negative PCR molecular test for Influenza A/B/RSV does not preclude the presence of the target pathogen. Clinical discretion is advised when reviewing results from these tests.
  A false negative result may occur if a specimen is improperly collected, transported or handled. False negative results may also occur if inadequate numbers of organisms are present in the specimen.
  This test cannot rule out diseases caused by other bacterial or viral pathogens.
  This test is a qualitative test and does not provide the quantitative value of detected organism present.

Legionella Urinary Antigen

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Urine
- **Volume -** 10ml
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** <24 hours
- **Notes/Limitations**
  Only ICU samples and requests from the Consultant Microbiologist are processed.
  A negative antigen result does not exclude infection with *Legionella pneumophila* serogroup 1.
  Culture is recommended for suspected pneumonia to detect causative agents other than *L. pneumphila* serogroup 1 and to recover *L. pneumophila* serogroup 1 when antigen is not detected in urine.

Monkeypox – as per externals for NVRL

Mouth Swab Culture & Sensitivities

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen –** Mouth Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Collect specimens before starting antimicrobial therapy where possible.
  It is advised that patients should not:
  1. Eat or drink within 2 hours
  2. Brush their teeth within 2 hours
  3. Use any mouth rinse of disinfectant within 2 hours prior to sampling
  4. If possible samples should be taken in the morning under fasting conditions

MRSA Screen Culture

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen –** Anterior Nares Swab/Groin Swab/Throat Swab/CSU/Wound Swab, Sputum if productive cough and any skin lesions (eg surgical site, PEG tube site)
- **Volume –** Urine – minimum 1ml
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 24 – 72 hours
- **Notes/Limitations**
  Refer to Infection Control Guidelines for any further information required on the management of patients with MRSA.

Mycology – Fungal Microscopy and Culture

- **Laboratory/Department -** Mullingar Microbiology
- **Specimen –** Skin/Scalp scrapings, nail clippings, Hair (roots/follicles)
- **Volume -** N/A
- **Container -** Scrapings/Hair/Clippings should be placed in DERMAPAK Envelopes or sterile universal containers
- **Colour Code -** Yellow Lid
- **Turnaround time –** Microscopy 48 hours to 1 week. Culture Final Report 28 days
- **Notes/Limitations**
  Do not put Skin Scrapings and Clipping between Slides. Loose slides should not be used. Do not use fixatives.

Nasal Swab Culture & Sensitivity

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Nasal Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**

Norovirus (Winter Vomiting Bug)

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Faeces
- **Volume -** 5 – 10gm
- **Container -** Blue Capped Universal Container with Spoon
- **Colour Code -** Blue
- **Turnaround time -** 48 hours maybe longer during outbreaks
- **Notes/Limitations**
  Service available for In-house patients only. Monday to Friday. Samples must be received before 2.00pm Midweek. There is no weekend/BH service for Norovirus detection.
  Clinical details and travel history must be indicated on request form. If in doubt, contact the Microbiology Laboratory.

Ova, Cysts and Parasites

- **Laboratory/Department -** Eurofins Biomnis
- **Specimen -** Faeces
- **Volume -** 5 – 10 gm (walnut size)
- **Container -** Blue Capped Universal Container with Spoon
- **Colour Code -** Blue
- **Turnaround time -** 1 week
- **Notes/Limitations**
  Approval by Consultant Microbiologist required

Pneumococcal Urinary Antigen

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen –** Urine, CSF
- **Volume –** 10ml
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 1 – 2 days
- **Notes/Limitations**
  Only ICU samples and requests from the Consultant Microbiologist are processed
  A negative *Streptococus pneumoniae* result does NOT exclude infection with *S. pneumonia.*

Pus/Fluid Culture & Sensitivity

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Pus & Fluid
- **Volume -** 2 – 3 ml
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Collect specimens before antimicrobial therapy where possible.

Semen Analysis

- **Laboratory/Department -** Rotunda
- **Notes/Limitations**
  By arrangement only. Contact the Rotunda

Sputum Culture and Sensitivity

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Sputum
- **Volume -** 1 – 2 mls
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Sputum samples should reach the laboratory within 4 hours. Any delay beyond this times may allow overgrowth of Gram-negative bacilli, additionally *Haemophilus* species and *Streptococcus pneumoniae* may not survive. If specimens are not processed on the same day as they are collected, interpretation of results should be made with care.
  Sputums for C&S and TB require separate samples for each.
  Salivary/Muco-salivary sputum samples are rejected.
  Collect specimens before antimicrobial therapy where possible.

Tuberculosis (TB) Microscopy - Acid Fast Bacilli (AFB) and Culture

- **Laboratory/Department –** Irish Mycobacteria Reference Laboratory (IMRL) St James Hospital
- **Specimen –** Sputum, CSF, Fluids, Urine, Tissue Samples, Bronchoalveolar Lavage samples, aspirates.
- **Volume -**
  Sputum: Collect early in the morning on at least 3 consecutive days. A minimum of 5ml per sample. Saliva and postnasal secretions are not suitable. Sputum – do not wash teeth or use oral hygiene products before collection. Sputum for C&S and TB require separate samples for each.
  CSF: Minimum 0.5ml collected aseptically into a sterile container.
  * Urine: Only processed by TB laboratory when the following is stated on the request form: - A diagnosis of renal or military tuberculosis is suspected. - Relevant clinical details are provided, e.g. "Sterile pyuria" "Haematuria" - The patient is immunocompromised. - The patient is under the care of a Nephrologist or Urologist - Following prior discussion with the laboratory director collect the entire early morning urine on 3 consecutive days. Refer 25ml of each collection to the Microbiology Laboratory. Doctor must contact SJH to request this test as they are not routinely performed
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time –** A.F.B. stain within 48 hours of receipt of the sample. Culture **-** 8 weeks for positive microscopy and positive cultures are telephoned to the requesting source immediately.
- **Notes/Limitations**
  Send 1 purulent specimen each day for 3 consecutive days, in separate containers.
  Following a positive microscopy/culture, a repeat sample is recommended. NOTE: An IMRL specimen request form must be completed to accompany specimens before they are sent to the IMRL. This form may be downloaded from the IMRL User Manual on the SJH website.

Sputum for Cystic Fibrosis

- **Laboratory/Department -** Crumlin
- **Specimen -** Sputum
- **Volume -** 1 – 2 mls
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** Up to 5 Days
- **Notes/Limitations**
  Highlight sample from CF patient. Samples sent to Children's Health Ireland CHI Crumlin (Hospital Only Requests)

Swabs for Virology

- **Laboratory/Department -** NVRL
- **Specimen –** Swab eg throat
- **Volume -** N/A
- **Container –** 1 Copan Pink Virus Transport Medium or 2 Red Biocomma transport and preservation medium
- **Colour Code –** Pink/Red
- **Turnaround time -** Check with NVRL if required
- **Notes/Limitations**
  Please hand deliver for urgent Lab attention: Monday to Friday. Sent to NVRL
  List viruses required on request form

Throat Swab (Bacterial)

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Throat Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black Swab
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Collect specimens before antimicrobial therapy where possible.
  Throat swabs should be taken from the tonsillar area and/or posterior pharynx, avoiding the tongue and uvula.
  Throat culture should not be taken if the epiglottis is inflamed as sampling may cause serious respiratory obstruction.

Throat Swab (Viral)

- **Laboratory/Department -** NVRL
- **Specimen -** Throat Swab
- **Volume -** N/A
- **Container –** Pink Copan Transport Swab or Red Biocomma transport and preservation medium
- **Colour Code -** Pink Copan or Red Biocomma
- **Turnaround time -** Check with NVRL
- **Notes/Limitations**
  Please hand deliver for Urgent Lab attention: Monday – Friday. Sent to NVRL. Please list the viral tests required. This is mandatory.

Tissue for Bacteriological Examination

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Tissue
- **Volume -** N/A
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Tissue samples for Microbiology must **NOT** be placed in formalin.
  Collect specimens before antimicrobial therapy where possible.

Umbilical Swab

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Umbical Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Collect specimens before antimicrobial therapy where possible.

Urethral Swab/Penile

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Urethral Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  For urethral specimens, patient should not have passed urine for at least one hour.
  Collect specimens before antimicrobial therapy where possible.

Urine for Culture & Sensitivities or MSU

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen –** Urine MSU, CSU, Bag, Supra Pubic Aspirate (SPA)
- **Volume -** Min 10ml – Max 30ml
- **Container -** Plain Sterile Universal Container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Make sure the container is properly sealed
  Urine dipstick for glucose, protein etc is not routinely performed on urines
  It is unnecessary to routinely send urines to the laboratory on all patient's attending Out-Patients Clinic except for the following patients:
  - Diabetic Patients
  - Patients with known renal disease
  - Patients with acute symptoms suggesting urinary tract infections eg urgency, frequency, dysuria, haematuria, fever

  Specimens should be transported to the laboratory as soon as possible. Where this is not possible refrigeration at 4°C is recommended. Please state if patient is pregnant or neutropenic on the request form. Please select the correct sample type on request form MSU/CSU. (Midstream Urine or Catheter Specimen Urine)
  Collect specimens before antimicrobial therapy where possible.

Urine for TB Culture

- **Laboratory/Department -** St James Laboratory
- **Specimen -** Urine
- **Volume -** 30 mls
- **Container -** Plain sterile universal container
- **Colour Code -** Yellow Lid
- **Turnaround time -** 8 weeks
- **Notes/Limitations**
  * Urine: Only processed by TB laboratory when the following is stated on the request form:
  - A diagnosis of renal or military tuberculosis is suspected.
  - Relevant clinical details are provided, e.g. "Sterile pyuria" "Haematuria" - The patient is immunocompromised.
  - The patient is under the care of a Nephrologist or Urologist
  - Following prior discussion with the laboratory director collect the entire early morning urine on 3 consecutive days. Refer 25ml of each collection to the Microbiology Laboratory. Doctor must contact SJH to request this test as they are not routinely performed.

Vaginal Swab (High/Low, Vulval)

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Vaginal Swab
- **Volume -** N/A
- **Container -** Charcoal Transport Swab
- **Colour Code -** Black
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  Clinical details essential.
  Collect specimens before antimicrobial therapy where possible.

VRE Culture

- **Laboratory/Department -** Portlaoise Microbiology
- **Specimen -** Rectal Swab/Faeces
- **Volume -** 5 – 10gm (walnut size)
- **Container -** Charcoal Transport Swab/Blue capped universal container with spoon
- **Colour Code -** Black/Blue
- **Turnaround time -** 48 – 72 hours
- **Notes/Limitations**
  VRE screening reserved for ICU/CCU patients only. Patient previously positive for VRE should **NOT** be rescreened

Wound for Culture and Sensitivity

- **Laboratory/Department –** Portlaoise Microbiology
- **Specimen –** Wound Swab
- **Volume –** N/A
- **Container –** Charcoal Transport Swab
- **Colour Code –** Black Swab
- **Turnaround time –** 48 – 72 hours
- **Notes/Limitations**
  Swabs – Culture & Sensitivity Sample Required: Use transport swabs. Please indicate type e.g., vaginal, throat etc. If wound swab, indicate site and also if skin lesion or deep-seated.

10.6 Criteria for Phoning Critical Results in Microbiology

The following are the instances in which validated Microbiology reports should be given by **phone**.

Faeces	Salmonella
	Shigella
	Campylobacter
	E.coli 0157 preliminary results for patients all ages
	VTEC all preliminary positive results for patients <5 years
	Cholera
	Rotavirus
	Adenovirus
	Cryptosporidium
	Giardia
	Yersinia
CSF	All CSF microscopy results
	All Positive culture results
HVS	Listeria monocytogenes
STI Screen	
Genital Swabs	Gonococcus & Trichomonas
Blood Cultures	All positive blood cultures to Consultant Microbiologist & Clinical Team
Intra operative gram stain request from theatre	
PCR	All first time positive CPE
	Clostridium difficile toxin positive
	Norovirus
MRSA/VRE Swabs	All new MRSA/VRE positive inpatients to be documented on Epidemiogical log for review by Infection Control Nurse daily (Monday to Friday)
Sputum	Aspergillus (inform Consultant Microbiologist)
Urine	Legionella pneumophilia antigen positive results
Urine/CSF	Streptococcus pneumoniae antigen positive results
Referred Samples	All positive PCR results: *Bordetella pertussis* Positive TB results All first time positive syphilis All first time positive HIV VRL phoned results (all) Any unexpected result should also be discussed with the appropriate Consultant/Doctor

11.0 HISTOLOGY AND CYTOLOGY REGIONAL SERVICES AT MRH TULLAMORE

Histology and Cytology
Phone 58342 (057 9358342)

Contact	Contact Number	Contact Email
Histology Secretaries Midland Regional Hospital Tullamore	58342 (in house) 057 9358342	Histo.MRHT@hse.ie
Histology Laboratory Midland Regional Hospital Tullamore	58338 (in house) 057 9358338	Histo.MRHT@hse.ie
Dr Margaret Lynch Consultant Histopathologist	087 2346389	Margaret.Lynch3@hse.ie

For results, please telephone the secretaries in the first instance.

The laboratory is contactable at the number above, but please do not enquire about reports at that number.

Please contact local IT if you need to access to the Histology Netacquire system and that can be arranged.

A copy of all histology reports is kept in the laboratory secretary's office, Portlaoise once the reports are fully authorised.

11.1 Histology Surgical Specimens/Biopsies

All specimens for routine histology should be fixed in 10% buffered formal saline.

All specimens must be accompanied by a white histology form, fully completed. Relevant **Clinical Details/History** is essential. Incomplete forms may result in the specimen being returned for completion of clinical details and a delay in tissue processing. The requesting Clinician/NCHD should sign the form LEGIBLY and include a bleep number.
(Note: Description of the specimen does not constitute clinical details)

All histology specimens are sent to Tullamore for processing. A taxi leaves Portlaoise hospital at approx. 08:00 daily with these specimens.

Specimens must be clearly labelled with patient's name, date of birth and the nature of specimen at a minimum.
Send Histology/Cytology specimens to the Laboratory with Porter. DO NOT USE PNEUMATIC TUBE SYSTEM.

Turnaround times for reports vary. Immunohistochemistry may be required and this can result in a longer turnaround time.

Where results are particularly **urgent** please write **'URGENT'** on the request form and call the Histology Laboratory extension 58338 (057 9358338) to advise laboratory staff that the specimen is urgent.
Urgent samples can be processed and reported the next day if they are fixed and arrive before 16:00 to the Histology Department MRH Tullamore.

Please **direct all queries** to the Histology/Cytology secretary based in the Midland Regional Hospital, at Tullamore extension 58342 (057 9358342).

11.2 Cytology

CYTOLOGY

The cytology laboratory in the Midlands region is based at Tullamore. Dr Margaret Lynch is the lead Cytopathologist for the acute hospitals in the Midland region. If there are queries around sample preparation please contact Dr Lynch directly (phone or email above, or via switchboard). If samples are urgent, please label them so.

Sputum cytology - This request requires a separate specimen (plain 60 ml white container) and a white histology/ cytology form. The mouth should be rinsed with water before collection. An expectorated sputum specimen is necessary – saliva is useless. The physiotherapist may provide assistance in producing a sputum specimen by assisting the patient with deep coughing following inhalation of nebulised saline. Ensure the sample arrives at the laboratory prior to 16:00.

Fluid samples (ascitic/pleural/urine)- Please ensure an adequate volume of fluid is provided – at least 30mL. As these samples are sent **fresh**, try to ensure that the sample arrives in the cytology laboratory MRHT on the same day. Please do not send samples after 16:00 or out of hours as they may not be packaged for the morning taxi. On-call staff do not deal with urgent cytology samples. Please ensure lids are tightly closed. Please provide clinical details on request cards.

Bronchoscopic samples (BAL/washings/TBNA) should ideally be added to CytoLyt solution after collection which is available to order in individual vials. Please contact the laboratory manager to discuss ordering. Each sample should have a separate request card and each should be clearly labelled as to location. Please provide clinical details on request cards. If for any reason CytoLyt is not available, please ensure that the samples arrive at Tullamore Hospital Cytology laboratory on the same day and inform a member of scientific staff that the samples are not in CytoLyt by contacting 0579358338.

FNA specimens should be performed by using a small 25 gauge needle and using direct air dried slides which are labelled in pencil with the patients name at the frosted end. The aspirating needle should then be rinsed in a vial of CytoLyt solution. Please provide clinical details on request cards.

11.3 Frozen Section Bookings

Frozen Sections are not processed in the Midland Regional Hospital, at Portlaoise. However Frozen section bookings can be arranged in advance by calling the Histology Laboratory in Tullamore, extension 58338 (057 9358338)

Arrangements must be made for the specimen to be transported immediately to the Histology Laboratory in Tullamore. Contact the Laboratory in Portlaoise to arrange a taxi. Please include a mobile phone number/extension number on the request form so that results can be phoned as soon as they are ready.

11.4 Requests for Post Mortems

Please inform Nursing Administration MRH Portlaoise, extension 6439 (057 8696439) or bleep 035 as soon as the death of a patient has taken place. It should then be decided whether the case is a **Coroners case** or a **Non Coroners case**.

If the cause of death is unknown and a death certificate cannot be written then it is likely that the patient will require a coroners post mortem. If the patient died within 24 hours of admission then the case should be discussed with the coroner. This does not necessarily mean that a post mortem will be ordered (unless the cause of death is unknown) and a death certificate cannot be issued. All discussions with the Coroner and Pathologist should take place as soon as possible after the death has occurred so as not to delay funeral arrangements.

There are other reasons why cases come under the jurisdiction of the Coroner (Coroners Act 1962) such as a death following a procedure e.g. operation or after a fall. All Coroners cases require direct discussion between the clinical team and the Coroner by telephone. In addition a fax is sent to the Coroner to inform him of the death. The patients Chart/Medical Notes should accompany the remains to the Mortuary in all cases.

If there is any uncertainty about whether a post mortem will be required then the clinical details should be discussed with the Coroner for County Laois, Mr Eugene O'Connor (086 8131317/057 8621329) and Dr Lynch Consultant Pathologist (087 2346389). The Coroner may decide to order a Post Mortem depending on the circumstances.

Coroner's cases DO NOT require a signed consent form. House cases (Non Coroners cases) do require a signed consent form. The Consultant Pathologist(s) are happy to provide advice to NCHD's when obtaining consent for Non Coroners cases particularly in relation to organ retention.

Neonatal post mortems
Neonatal post mortems may be arranged through Nursing Administration who will then contact a perinatal pathologist who may arrange to do the post mortem on site or may be facilitated at an offsite location. In any event the medical notes and the placenta will be required at the time of the post mortem. A consent form will need to be signed if the case is not a coroners case. The requesting doctor should as a matter of routine discuss the case with the perinatal pathologist. Issues around organ retention may need to be communicated to the family.

In the case of a paediatric death the case may be a coroners case depending on the circumstances. Some paediatric cases may be done on site locally. Others may require the expertise of a Paediatric Histopathologist and may be transferred to Our Ladys Hospital Crumlin, again after discussion and agreement with the Pathologist in Crumlin.
Contact the Pathologist who carried out the Post Mortem regarding any queries relating to Neonatal Post Mortems.

A leaflet in relation to Post Mortem procedures and organ retention is available in Nursing Administration and should be given to the families of all patients undergoing a Post Mortem.

In general post mortem reports take at least 3 to 6 months to be finalised. If a report is required urgently please contact the relevant Pathologist directly.

Louise Cooke (Bereavement Support Nurse mobile 086 4177400) is available Monday to Friday 08:00 to 17:00 to inform families about issues pertaining to organ donation.

11.4 Special Requirements for Specimens, including Cervical Smears

Tissue: Tissue removed from theatre for **culture** must not be placed in formalin, but should be sent unfixed to the microbiology lab as soon as possible, with a separate request form.

Skin Biopsies for Immunofluorescence: It is essential to contact the Histology Department, in the Midland Regional Hospital at Tullamore **before** the biopsy is taken, as arrangements must be made with St James Laboratory in advance. These specimens must **not** be placed in formalin.

Cervical Cytology: Cervical cytology is referred to an External Laboratory. Specimens may be sent directly or via the laboratory. Please note results may take some time.

Sputum Cytology for Malignant Cells: This request requires a separate specimen (plain 60 ml white container) and a white histology / cytology form. The mouth should be rinsed with water before collection. An expectorated sputum specimen is necessary – saliva is useless. The physiotherapist may provide assistance in producing a sputum specimen by assisting the patient with deep coughing following inhalation of nebulised saline.

Other body fluids for Cytology: Please send to laboratory in plain container as soon **after** collection as possible, with an appropriate request form. Relevant clinical details are essential for proper assessment. Ideally specimens for cytology should reach the Histology Department in Tullamore on the day that they are taken as they can deteriorate quickly. If Fine Needle Aspiration Cytology (FNAC) is required please contact Dr Lynch who may be able to perform the FNA or give advice in the appropriate preparation of the specimen.

12.0 PHLEBOTOMY SERVICE

A Phlebotomy Service is available for in-patients at the Midland Regional Hospital, Portlaoise. The Phlebotomists are under the control of the Director of Nursing. The phlebotomists visit the wards Monday to Friday between 07:30 to 12:30.
A routine phlebotomy service is available on Saturdays, Sundays or Bank Holiday from 07:30 to 12:00.

Doctors are requested to ensure that request forms are completed before the phlebotomist arrives.

Should a patient be unavailable for venepuncture, or if a specimen cannot be obtained, the phlebotomist will notify the ward staff as soon as possible.

NCHD's are responsible for taking specimens at all other times. All inpatient routine specimens on Saturdays, Sundays or Bank Holidays must reach the laboratory before 12:00 for same day processing.

Refer to procedure in the clinical area for Blood sampling by Venepuncture, and Procedure for taking Blood Cultures.

This service is for genuine medical emergencies **only**, where the results are likely to influence immediate management of the patient.

13.0 REPORTING OF TEST RESULTS

13.1 General Information

The Laboratory does not report test results directly to patients.

Hard Copy Reports
Hard copies of the report are issued on the day of test report release. Hardcopy reports are issued to the Ward, Clinician or external practitioner e.g. General Practioners (GP's) for the patient's file, as appropriate.

All results whether processed in-house or externally by our Referral Laboratories are returned to the Requestor in Hard Copy Format, as soon as they are available.

Test reports from the other two laboratories in the Midland Area i.e. Midland Regional Hospital at Tullamore and the Midland Regional Hospital at Mullingar are sent directly to appropriate ward/clinician.

Test reports from all other external laboratories are scanned retrospectively on the Laboratory Information System and the hard copy report is sent directly to appropriate ward/clinician.

Electronic Reports
Net Acquire is the software programme used by the Laboratory in Midlands Regional Hospital, Portlaoise for the management and processing of Laboratory Samples.

Test reports from the Pathology Department in the Midland Regional Hospital at Portlaoise, once released, are available on the Laboratory Information System (LIS) with the exception of specimens sent for analysis to external laboratories.
Test reports from MRH Mullingar Endocrinology and Immunology are also available on LIS.

Electronic Internal Reports (In-house)
Results for inpatients (In House) are available electronically via Ward Look up (Laboratory result look up system 'Ward Lookup')
The Laboratory Information System is accessible on Hospital Wards on Ward look up.
Results available include Biochemistry, Haematology and Microbiology reports.
Blood Transfusion reports are not accessible on Hospital Wards on Ward Look up).

External Reports
Results for external patients are available electronically via Healthlink.
Healthlink is the National Project to facilitate GP electronic access to validated Laboratory results.

Healthlink is the National Health Messaging broker and provides a web-based messaging service which allows the secure transmission of clinical patient information between Hospitals, Health Care Agencies and Medical Practitioners. Healthlink is funded by the HSE and all services are free of charge to GPs.

External Service Users of the Laboratory are required to register with the Laboratory to receive electronic access to Results via Healthlink.
GP's can access Laboratory Biochemistry and Haematology reports electronically via Healthlink. Blood Transfusion and Microbiology reports are not available via Healthlink.

The Laboratory can only process samples for Service Users who are registered with the HSE.

External Service Users of the Laboratory are required to provide an Out of Hours Number for the Communication of Critical Results (Mandatory).

Telephone queries
For **telephone queries please direct all calls to the laboratory office where possible.** Please limit the number of calls regarding patient results as the majority of results are available on the Laboratory result look up system 'Ward Lookup' for internal patients or Healthlink for external patients. Refer to section 3.2 for contact numbers.

13.2 Printed Reports within the Hospital

Printed laboratory reports are dispatched to the ward areas by the portering staff twice daily at 13:00 and 17:00, excluding weekends and bank holidays.

13.3 Printed Reports for External Locations

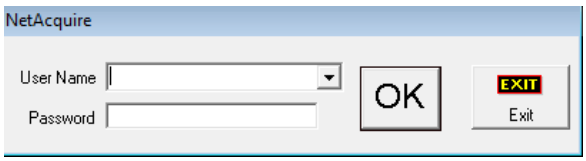
Printed laboratory reports for locations outside the hospital are sent via internal mail, courier or by post on the day of testing where results are available before 14:00

13.4 Ward Look up

Ward look up (Laboratory result look up system 'Ward Lookup') is a facility where validated Laboratory results may be accessed from the Laboratory Information System (LIS) at a remote terminal. The system is password controlled and available to authorised personnel only. Currently this is available only in clinical areas within the Midland Regional Hospital at Portlaoise.
Contact the Laboratory to request access to the Ward Look Up System.

Ward Look up Instructions for use
Click the 'Click to Log On' icon to activate the log on screen.
Click ward enquiry icon to activate the laboratory result look up screen.

Log on
Enter user name as follows, first name followed by surname
Enter your password. This gives access to the search screen.



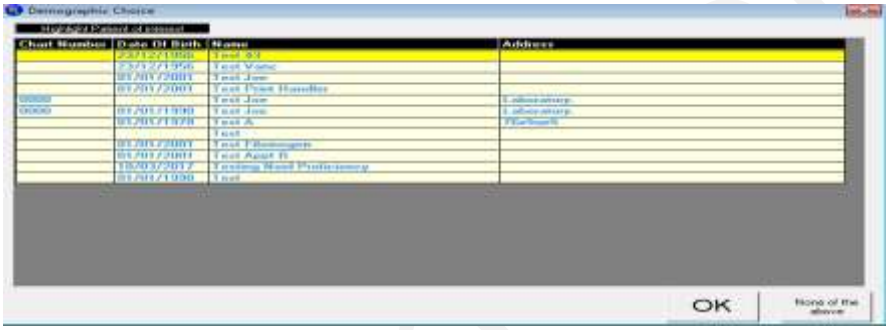
Search screen

Search for a patient by using any one of the three options above as described.

- Cart number (Hospital Number)
- Name (Surname Forename)
- Date of Birth

This will present you with a list of patients to choose from.

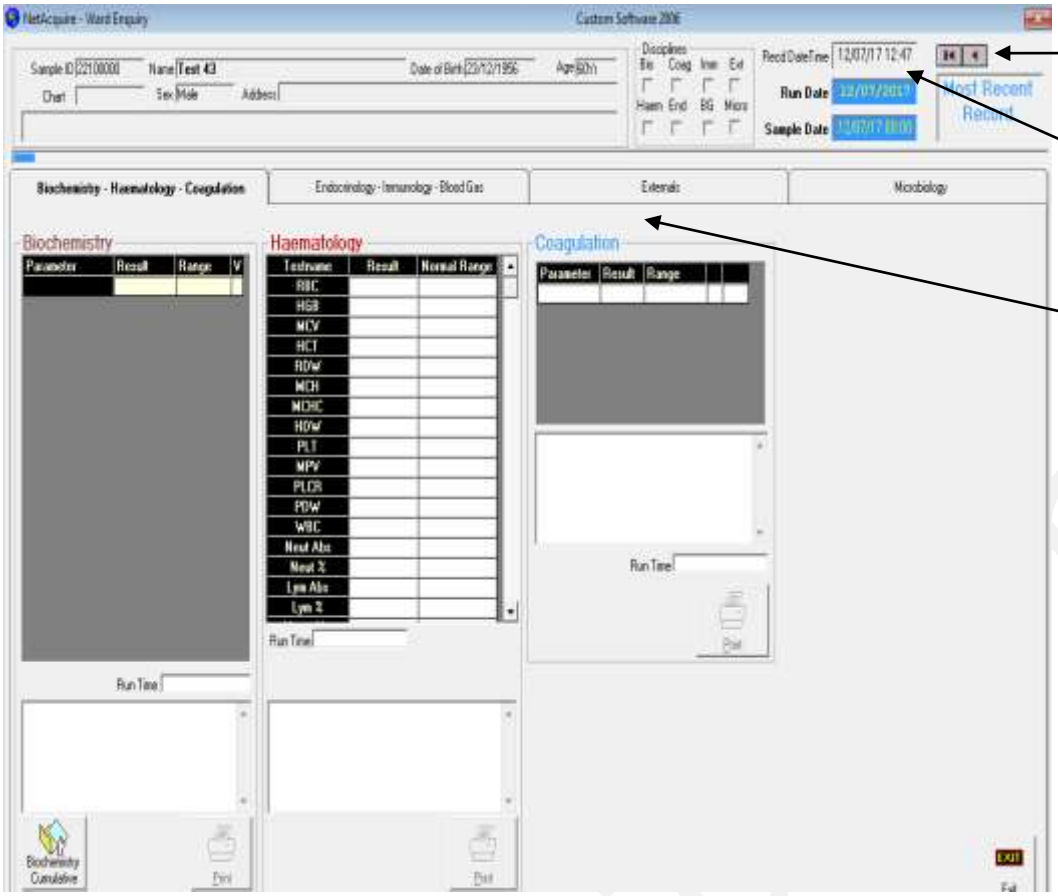
The patient with the most recent lab results is always displayed at the top of the list.



Highlight the patient required and select OK to return the results.

If the patient required is not on the list then select "None of the Above'' to start again.

Result Screen



The view result screen displays the result for the selected patient.
NOTE If the Biochemistry/Haematology/ Coag Tab has no results, **check all of the other tabs** as this may be a Microbiology Sample

The Run Date and sample Date is highlighted
NOTE Samples without a sample time provided on the request form will NOT Display in order. The system defaults these samples to midnight so samples without a time specified will appear as earlier results. CHECK THE RUN TIME to ensure correct results are interpreted.

The arrow keys move you through records in increments of one.

NOTE: it is important to scroll back to see other results even from the same date but a different Laboratory number.

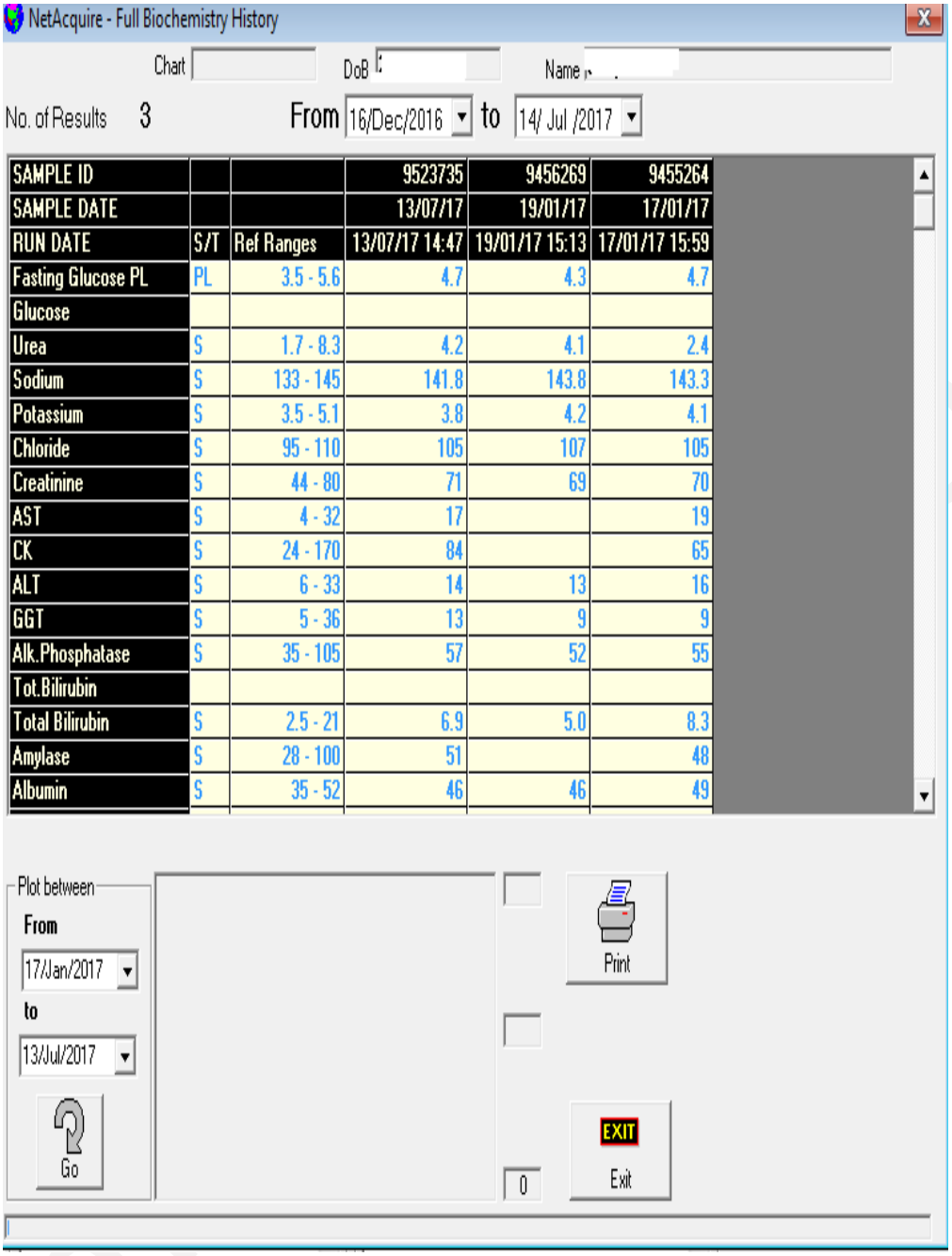
The top right hand indicator check boxes inform you of the departments with results.
Sample comments will appear below the results e.g. Haemolysis, clotted.
You can move between departments by clicking on the Tabs above the results.
The Print icon allows you to print the results displayed on the screen.
The **cumulative icon** allows you to view cumulative results (See example below)

Notes

- Endocrinology and Immunology tests are available under the Endocrinology Tab.
- Tests sent to external laboratories may not be on ward lookup. Contact Laboratory Office.
- User passwords expire every 90 days.
- The system will prompt you to enter a new six digit password.
- Remember your password and don't give it to others.
- If you believe your password is compromised contact the laboratory for a new password.
- Only validated results will be available for viewing.
- An audit on all look ups is maintained by the system.
- **Print all results. Please Do Not transcribe results on paper**.

- Refer to IT Acceptable Usage policy available on the HSE intranet
- A Hard copy of Laboratory results will be forwarded to the clinical area.

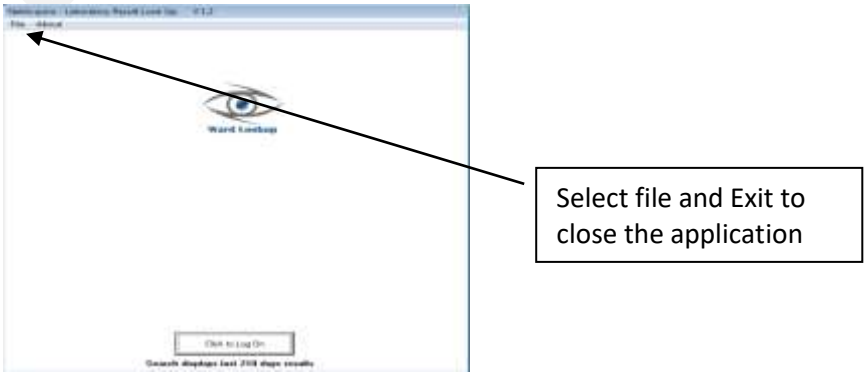
Cumulative Result Screen



SAMPLE ID			9523735	9456269	9455264
SAMPLE DATE			13/07/17	19/01/17	17/01/17
RUN DATE	S/T	Ref Ranges	13/07/17 14:47	19/01/17 15:13	17/01/17 15:59
Fasting Glucose PL	PL	3.5 - 5.6	4.7	4.3	4.7
Glucose					
Urea	S	1.7 - 8.3	4.2	4.1	2.4
Sodium	S	133 - 145	141.8	143.8	143.3
Potassium	S	3.5 - 5.1	3.8	4.2	4.1
Chloride	S	95 - 110	105	107	105
Creatinine	S	44 - 80	71	69	70
AST	S	4 - 32	17		19
CK	S	24 - 170	84		65
ALT	S	6 - 33	14	13	16
GGT	S	5 - 36	13	9	9
Alk.Phosphatase	S	35 - 105	57	52	55
Tot.Bilirubin					
Total Bilirubin	S	2.5 - 21	6.9	5.0	8.3
Amylase	S	28 - 100	51		48
Albumin	S	35 - 52	46	46	49

Log out

Select file and Exit to close the application



13.5 Healthlink

Healthlink is the National Project to facilitate GP electronic access to validated Laboratory results.

Validated Laboratory results are securely transferred from the Laboratory Information System (LIS) through the government Virtual Private Network (VPN) to the Mater Hospital. GP's may access laboratory results from the Mater using a remote terminal, via **secure access** on the internet.

13.6 Urgent Critical Results

Results of urgent investigations and all abnormal/critical results will be telephoned/faxed. We appreciate it if telephone enquiries are limited to those results that are urgent or delayed. Please check there is no electronic, written or faxed report before enquiring over the telephone. Reports are faxed to agreed supervised fax machines only. Records of phoned/faxed results are maintained.

Refer to section 7.0 for Criteria for phoning critical results in Biochemistry.

Refer to section 8.0 for Criteria for phoning critical results in Haematology and Coagulation.

Refer to section 10.0 for Criteria for phoning critical results in Microbiology.

Telephone queries
For **telephone queries please direct all calls to the laboratory office where possible.** Please limit the number of calls regarding patient results as the majority of results are available on the Laboratory result look up system 'Ward Lookup' for internal patients or Healthlink for external patients. Refer to section 3.2 for contact numbers.

13.7 Biological Reference Intervals (Reference Ranges)

Biological Reference Intervals (Reference Ranges) for tests are documented on all reports where applicable. Please take into account the patients clinical condition when interpreting results.

Please note that reference intervals are impacted by many factors e.g. Age, Gender, fasting status, local population and method of analysis. To facilitate the application of all reference intervals, Date of birth and gender MUST be specified because accurate reference intervals cannot otherwise be provided with the test result report. It is the responsibility of the clinician to provide accurate information to the laboratory. Furthermore, requesting clinicians should be aware of the gender that is being used to assign reference intervals and also that gender affirming therapy may have an impact on laboratory test results.

Reference Intervals in Pregnancy:
All reference ranges quoted on reports relate to the Non-Pregnant state. A list of pregnancy related reference ranges specific to the methodology used in the Pathology Laboratory in MRHP and obtained from relevant sources is available. Refer to:
Section 7.5 Biochemistry Biological Reference Intervals (Reference Ranges)
Section 8.5 Haematology Biological Reference Intervals (Reference Ranges)

Warning:

Many diaries and handbooks and laboratories provide lists of reference intervals for common analytes. You are asked not to refer to these in the interpretation of results generated by the Pathology Department MRH Portlaoise. The use of inappropriate reference intervals can be at best confusing and at worst dangerous. If you are in any doubt about the validity of any reference interval provided to you, please contact the relevant department of the Pathology Department for clarification.

14.0 POINT OF CARE

Near Patient Testing/Point of Care

Introduction

The Pathology Department, Portlaoise provides a routine near patient testing service to the hospital.
Tests performed as part of the Near Patient Testing service are not currently cover under the INAB scope of accreditation.
DEFINITION: Testing performed by non-laboratory staff near to, or at the side of the patient rather than in the clinical laboratory environment.
BENEFITS: Rapid generation of a VALID and ACCURATE result can contribute to improved outcomes for patient.
DRAWBACKS: Lack of adherence to NPT procedures and protocols may result in generation of an INCORRECT RESULT which may impact diagnosis/care pathway of patient negatively.
A near patient test result should be interpreted in conjunction with patient's history and/or clinical presentation.

Contact Details		
Monday-Friday (excl. public holidays)	Routine Hours (9:00-17:00)	Caitriona Ging 087 4869368 Speed dial *51755 caitriona.ging@hse.ie
On-call hours, Saturday, Sunday, Public Holiday	There is limited support available for **bloodgas** analysis during on-call hours under the remit of the **Biochemistry** Department. Please phone Biochemistry/Microbiology on-call phone *51769 (0872511468) during 09:00 – 14:00 sessions on Saturday/Sunday/Public Holiday. There is limited support available for **Respiratory Virus analysis** analysis during on-call hours under the remit of the **Microbiology** Department. Please phone Biochemistry/Microbiology on-call phone *51769 (0872511468) during 09:00 – 14:00 sessions on Saturday/Sunday/Public Holiday.	

Point of care services are provided by the Senior Medical Scientist for Near Patient Testing/Point of Care during routine hours including:

- Review of reagent/consumables
- Review of IQC
- Review of EQA
- Advisory service

The Laboratory Consultant Chemical Pathologist and Consultant Microbiologist provide clinical advice where required.
The Biochemistry Department and the Microbiology Department provide cover for the Point of Care SMS during the routine working day when required.

Location
Location of the Siemens **Rapidpoint 500** Blood Gas analysers and associated back-up devices are listed below:

Location	Back-up	Alternative Back-up
ED-RESUS	ED-Ambulance Reception	ED-RAU
ED-Ambulance reception	ED-RESUS	ED-RAU
ED-RAU	ED-RESUS	ED-Ambulance reception
CCD	ED-RAU	ED-RESUS
Paeds	ED-RAU	Labour ward-medicines room
Labour Ward-Medicines room	Paeds	CCD

There are 2 Siemens **Rapidpoint 1200** Blood Gas analysers located on the corridor of the Labour ward for foetal scalp/cord blood samples analysing pH, PO_2 and PCO_2 only. An alternative back-up for these analysers is the Rapidpoint 500 located in the Labour ward medicines room.
Please use assigned back-up analyser if the device in your location is out of order.

Specimen/Volume required
Collect whole blood using standard pre-heparinised 5ml syringes.
For Paediatrics/Neonates pre-heparinised capillary tubes can be used.
Minimum specimen volume is 60µl for pH, pCO_2 and pO_2 (capillary/ foetal scalp sample) and 100µl for full profile.

Turnaround time
It takes <2minutes to obtain a result.

Reference Intervals (reference ranges)

pH:	7.35 – 7.45
pCO^2:	4.67 – 6.00 kPa
pO^2:	11.06-14.39kPa
Lactate	0.4-2.2mmol/l
Glucose	3.5-5.3mmol/l
Na^+	136-145mmol/l
K^+	3.5-5.10mmol/l
Cl^-	98-107mmol/l
Ca	1.15-1.33mmol/l
HCO_3^-act	21.0-28.0mEq/L
BE(B)	-2.0 – 3.0
COHb	0.0-3.0%
O_2Hb	94-98%
tHb	11.5-17.8%
HHb	0.0-2.9%
MetHb	0.0-1.5%

**The reference ranges given are applicable to adult patients with unspecified gender and age. Reference intervals, although useful as a guideline for clinicians, should not be used as absolute indicators of health and disease. The reference intervals presented are for general information purposes only.

Notes/Limitations
Analysis must be carried out **within 30 minutes** of sample collection for accurate analysis. Reject samples for analysis which are >30 minutes old.

ABG measurements are particularly vulnerable to preanalytic errors. Despite proper sampling procedures, errors can arise in the blood gas analysis due to insufficient mixing of the sample, due to ambient air contamination caused by air bubbles that are not removed following removal of the sample and due to delayed analysis.

*Sharing of user passwords is forbidden and the practice is monitored. Persistent password sharing will result in user deactivation. Reactivation will only be possible post retraining.

Location

GeneXpert analysers and associated backup devices are listed below:

Location	Back-up
ED-RAU	Paediatric ward
Paediatric ward	ED-RAU

The GeneXpert devices are validated for SARS-CoV-19, Respiratory Syncytial Virus (RSV) and Influenza A&B.

Specimen/Volume required

Biocomma Naso-pharyngeal swab in virus transport medium- Red top medium. At least 1ml transport medium is required.

Turnaround time

It takes 35 minutes to obtain a result.

Notes/Limitations

- Retest specimens with a result of **INVALID**, **ERROR**, or **NO RESULT**. Use the leftover sample from the original specimen transport medium tube. Use a **new** cartridge (do not re-use the cartridge).
- A false negative result may occur if a specimen is improperly collected, transported or handled. False negative results may also occur if inadequate numbers of organisms are present in the specimen.
- This test cannot rule out diseases caused by other bacterial or viral pathogens.
- This test is a qualitative test and does not provide the quantitative value of detected organism present.

Location
All clinical areas have access to a Clinitek Status+ analyser.
Specimen/Volume required
Collect freshly voided urine in a clean universal container (yellow) and test as soon as possible, within 2 hours after voiding. The container should allow for complete dipping of all reagent strip areas (approx. 10ml).
Turnaround time
It takes <3 minutes to obtain a result.

Test Name	Expected value (normal) in urine	Test Sensitivity	Limitations
Leukocyte	None	5-15 white blood cells/hpf	Elevated glucose levels may cause decreased results.
Nitrite	None	0.06-0.1mg/dl	Pink spots or pink edges should not be interpreted as a negative result
Protein	<15mg/dL (negative result on strip)	15-30mg/dL	A visibly bloody urine may cause falsely elevated results
Blood	None	0.015-0.062mg/dl haemoglobin	Blood is often, but not always found in the urine of menstruating females
Glucose	<30mg/dL (negative result on strip)	75-125mg/dl glucose	
Ketone	None	5-10mg/dl	False results may occur with highly pigmented urine
Bilirubin	0.02mg/dl (negative result on strip)	0.4-0.8mg/dl	
Urobilinogen	0-1.0mg/dl	0.2-2.0mg/dl	
pH	4.6-8.0	5-9	Bacterial growth may cause an alkaline shift (pH>8)
Specific Gravity	1.001-1.035 (Result > or = 1.023, the concentrating ability of the kidneys can be considered normal)	1.000-1.030	The presence of protein may cause elevated readings.

The CLINITEK Status+ Analyser provides automated reading of the Multistix® family of urinalysis tests:

Test Name	Expected value (normal) in urine	Test Sensitivity	Limitations
Clinitest hCG	Negative in normal urine. Positive (>25IU/ml) in pregnancy	>25IU/mL	Negative Results may be obtained if the urine sample is too dilute. Normal pregnancy cannot be distinguished from an ectopic pregnancy.

The CLINITEK Status+ Analyser also provides automated reading of the Clinitest hCG pregnancy test cassette

Specimen/Volume required
Collect specimen in a Universal container (yellow) – specimens collected at any time of the day may be used but an early morning sample is the most appropriate sample for pregnancy confirmation. A minimum volume of 500µl is required to allow for dead volume. Test fresh sample within 2 hours of collection.
Turnaround time
A result is obtained in <5 minutes
Notes/Limitations
Failure to follow the correct testing procedure will result in an erroneous result.
Hints to Avoid Errors:
- Use only pipette provided with each cassette pack to ensure proper volume of 200 µL is dispensed.
- Do not overfill sample well with more than one pipette stem of sample.
- Do not empty overflow reservoir. It is normal for excess sample to remain in overflow reservoir. Do not try to dispel it.
- Do not add sample to the sample well until after you press the START button.
- Visibly bloody or highly coloured samples should not be tested

A fresh urine sample may be collected 48-72 hours post initial borderline result and tested.
A serum sample must be taken for ß-hCG quantitation in the event of:
1. Borderline result where result is required URGENTLY.
2. Negative result where there is a suspicion of pregnancy.
3. Clinitest hCG result does not fit with patient history or clinical presentation.

Glucose/Ketone meters

Location
There are glucose/ketone meters located in all clinical areas.
Specimen/volume required
- A finger prick sample is required and should be tested immediately.
- 1.2 µl Sample required for Glucose
- 0.8 µl Sample required for Ketone

Turnaround time
- Glucose Results in 6 Seconds, Ketone Results in 10 Seconds

Glucose Reference Interval (reference ranges):
4-8mmmol/L
Glucose Measurement Range:
0.6-33.3 mmol/L
Blood ketone testing should be performed whenever glucose exceeds 13.9 mmol/L
Diabetes UK, the Canadian Diabetes Association, the European Society for Paediatric Endocrinology, and the American Diabetes Association (ADA) recommend that blood ketone testing be performed whenever glucose exceeds 13.9 mmol/L for rapid detection or prevention of diabetic ketoacidosis (DKA).
Ketone Reference Interval (reference ranges):
- Green: 0- 0.6mmol/L - normal
- Amber: 0.6 to 1.5mmol/L – test again in 1 hour
- Red: >1.5 - risk of DKA

Ketone Meter Measurement Range:
0.1-7.0 mmol/L
Notes/Limitations
The Glucose/ketone meters are unsuitable for monitoring in patients with the following:
- Poor peripheral perfusion
- Haematocrit less than 10% and greater than 65%

Confirmatory testing is required in the following scenarios:
- NPT glucose result is less than or equal to (≤) 2.5mmol/L.
- NPT glucose result is greater than or equal to (≥) 20.0mmol/L.
- NPT glucose testing is not suitable for patients with poor peripheral perfusion
- If a repeat blood glucose result does not reflect the patient's clinical symptoms.

HbA1C Meters

Location
There are 3 DCA vantage analysers for testing HbA1C in the Diabetic Department, 2 located in OPD A and 1 in OPD B.
Specimen/Volume required
1µl of blood is required from a finger prick sample.
Turnaround time
A result is obtained in 6 minutes.
HbA1C Reference interval (reference range) in mmol/mol

Normal value – person without diabetes	Below 42
Risk of hypoglycaemia (in diabetes)	Below 42
Ideal diabetes control	42-53
Acceptable diabetes control	53-58
Need to discuss your current management	59-75
High – increased risk of complications	Above 75

DCA Vantage HbA1C meter measuring range

4mmol/mol - 130 mmol/mol
Notes/Limitations
Patients with severe anaemia and patients with polycythaemia are unsuitable for monitoring by this method and should have samples referred to the Laboratory for analysis.
Results preceded by a less than (<) sign, report the results as <4mmol/mol.
A greater than sign in (>) the display indicates a concentration above the upper limit of the test. Report the results as >130 mmol/mol.
If any result appears questionable or if the clinical signs and symptoms appear inconsistent with the result, re-test the patient and / or confirm the results by sending a labelled EDTA sample to the Laboratory.

Training and passwords for Point of Care/Near Patient Testing Devices

Training and competency assessment is required for access to **all** Point of Care/Near patient Testing devices under the governance of the Senior Medical Scientist for Near Patient Testing/Point of Care. Passwords are given once training is completed and expire after 2 years.
To schedule training email caitriona.ging@hse.ie Phone: 087 4869368

Reporting Of Point of Care/ Near Patient Testing Device Breakdowns

Please email NPT/POC Senior Medical Scientist with details of the breakdown event, to include:
- Name of device
- Location of device
- Serial number of device
- Details of error incident including error code display, description
- Date and time of event
- Name of reporter
- Contact details of reporter to include email address and telephone number

15.0 TESTS REFERRED TO EXTERNAL LABORATORIES

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
1,25 Dihydroxy Vitamin D	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes	Must be received in laboratory <4 hours. Also known a Calcitriol/ 1,25(OH)2D	Separated and frozen <4 hours
25 Hydroxy Vitamin D3 / 25 Hydroxycholecalciferol or Calcidiol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	Yes	Also known as Calcidol or 25-OH - D3	Refrigerated
5 HIAA(5 Hydroxy Indoleacetic Acid) Adult	Eurofins Biomnis	Urine	20ml	24 hour Urine Container		Brown / Yellow	5 days	Yes	Urines have to be stored refrigerated during the collection process DIET: within 48 hours prior to the assay, avoid consuming bananas, chocolate, dried fruit, citrus fruit, avocados, tomatoes, plums, kiwis, pineapples and molluscs	In laboratory: Acidify prior to testing to pH 2-3 Total Volume must be stated Freeze 2-3ml aliquot in T28 Tube available in lab coldroom
5 HIAA (5 Hydroxy Indoleacetic Acid), Paeds <14 years	Beaumont	Urine	20ml	Universal Container		Yellow	5 days	Yes	20mls Spot urine	Acidify to pH 4

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
5 Hydroxy-Tryptamine (Serotonin) Blood	Eurofins Biomnis	Blood	2 x 2.7 ml	Lithium Heparin Whole blood		Orange	6 days	**Hospital Only**	Must be received in laboratory immediately and processed < 1 hour. DIET: in the 48 hours preceding the sample, avoid foods or drinks rich in tryptophan (essential amino acid constituting serotonin): oily fish, poultry livers, brown rice, dairy products, bananas, chocolate / cocoa, dried fruits (nuts, almond, cashew nuts, dates), mango, avocado, tomato, plum, kiwi, pineapple, shellfish, beans and legumes, pumpkin seed Note that taking antidepressants such as IRRS (serotonin reuptake inhibitors) may decrease the basal level of serotonin. 2 specific aliquots for this analysis	Whole blood frozen <1 hour
5 Nucleotidase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
7 Dehydrocholesterol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 weeks	**Hospital Only**	Must be received in laboratory within <4 hours. Store away from light - Only taken on Mon and Tue - Needs Metabolic Consent Form available from Eurofins Biomnis site (R26-INTGB) signed by Patient and Pathologist	Separated and frozen <4 hours Store away from light
10 Hydroxy Carbazepine (Trileptal)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	**Hospital Only**	Do not use tubes with separator gel. Must be received in laboratory within <4 hours. Clinical information and medication quantification required.	Separated and frozen <4 hours
11 Deoxycortisol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1-2 weeks	**Hospital Only**		Refrigerated
11 Deoxycorticosterone	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 weeks	**Hospital Only**		Refrigerated
17 Hydroxy Progesterone Adult	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Take at the beginning of follicular phase	Refrigerated
17 Hydroxy Progesterone (Paeds)	Crumlin	Blood	1.1ml or 1.2ml	Serum	 or 	Brown or White	7 days	**Hospital Only**	Patient at least 48 hours old prior to sampling To be frozen ASAP	Separated and frozen ASAP
21 Deoxycortisol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2-4 weeks	**Hospital Only**		Refrigerated
25 Hydroxy Vitamin D3	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
25 Hydroxycholecalciferol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	Yes	Same as Vitamin D3	Refrigerated
ACE (Angiotensin Converting Enzyme)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	Yes	Non haemolysed - must be received in the laboratory quickly for centrifugation	Centrifuge immediately
ACTH (Adrenocorticotropic Hormone)	St James	Blood	2.7ml	EDTA		Red	6 days	**Hospital Only**	Send to lab ASAP or on ICE for Processing Centrifuge and freeze plasma within 30 minutes	Separate and freeze <30 minutes
Acetylcholine Receptor Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must be received in laboratory <4 hours	Separate and freeze <4 hours
Acid A-Glucosidase / Alpha Galactosidase A	Eurofins Biomnis	Blood	2.7 ml	EDTA / Guthrie Card		Red	4 weeks	**Hospital Only**	2 ml EDTA blood on Guthrie card, keep at ambient temperature. Requires R26 Metabolic Biochemistry form	Ambient
Acid Phosphatase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerate
Activated Protein C Resistance / Ratio	National Centre for Hereditary Coagulation Disorders	Blood	2x3ml and 2x2.7ml	Sodium Citrate and EDTA	 and 	Green and Red	8 weeks	**Consultant Only**	Also part of Thrombophilia Screen. Send to lab ASAP for Processing as per Factor Assay Needs Thrombophilia Request Form (St James Haem Form 1429)Testing for APCR, Factor V Leiden and Prothrombin gene mutation analysis requires patient genetic consent.	Processed as per Thrombophilia Screen

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Acyl Carnitine (Guthrie Card)	Temple Street / Eurofins Biomnis See comment	Guthrie Card		Guthrie Card			>14 days	**Hospital Only**	Make sure Card is very dry Include clinical details, patients address and gender Must have TS Metabolic request form	Ambient. If no clinical details or Autism/ASD only send to Biominis
Adalimumab (Humira)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 weeks	Yes	Must have sample and treatment information or Anti-TNF alpha levels and Antibodies form available on Eurofins website	Refrigerate
Adalimumab Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 weeks	Yes	Must have sample and treatment information or Anti-TNF alpha levels and Antibodies form available on Eurofins website	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
ADAMTS 13 Assay	Belfast City Hospital	Blood	2 x 3ml	Sodium Citrate		Green	5 days	**Consultant Only**	Requires ADAMTS form	Spin at 2000g/10 min separate and spin again at 2000g/10 min separate avoiding buffy coat and put into 3 x 0.5ml aliquots and freeze - arrange dry ice with Biomnis Requires ADAMTS activity request form Belfast City Hospital Haemostais and Thrombosis Lab, Dept of Haematology, Belfast City Hospital, Lisburn Road, Belfast BT9 7AB - 0044 (0) 2890329241
ADAMTS 13 Assay	NCHCD	2 x 3ml	Sodium Citrate		Green	1-2 days	**Consultant Only**		Spin at 2000g/10 min separate and spin again at 2000g/10 min separate avoiding buffy coat and put into 3 x 0.5ml aliquots and freeze

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Adenosine Deaminase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 Weeks	**Hospital Only**	Non haemolysed sample	Refrigerate-stable for 7 days also accepted frozen.
Adenosine Deaminase	Eurofins Biomnis	Ascites Or Pleural Fluid or CSF	4.9ml	Universal Container	 or 	Yellow / White CSF Container	6 Weeks	**Hospital Only**	Non haemolysed sample	Refrigerate-stable for 7 days also accepted frozen.
Adenovirus PCR	NVRL	Blood	4.9ml or 2.7ml	Serum or EDTA	 or 	Brown or Red	5 days	**Hospital Only**		Freeze serum/plasma within 24 hours unless arrival to NVRL <24 hours
Adenovirus PCR	NVRL	CSF	2.7ml	CSF	 or 	Yellow / White CSF Container	5 days	**Hospital Only**		
Adenovirus Swab	NVRL	Swab		Viral swab		Pink	5 days	**Hospital Only**		
Adiponectin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	40 days	**Hospital Only**	Must be received in laboratory immediately. Processed < 1 hour	Separated and frozen <1 hour
Adrenocorticotropic Hormone (ACTH)	St James	Blood	2.7ml	EDTA		Red	6 days	**Hospital Only**	Send to lab ASAP or on ICE for Processing Centrifuge and freeze plasma within 30 minutes	Separate and freeze <30 minutes
Aldolase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Ideally taken after 30 minutes rest Non haemolysed serum sample	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Aldosterone Blood	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	4 days	**Hospital Only**	Must be received in laboratory <4 hours. Collect samples in morning after patients have been out of bed for at least 2 hours and have been seated for 5-15 minutes. Non Haemolysed or lipemic sample.	Separated and frozen < 4 hours
Aldosterone Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / Yellow lid	6 days	**Hospital Only**	Received in laboratory <4 hours. Total volume must be stated. Lab use T28 Tube	Frozen <4 hours. Total volume must be stated. Lab use T28 Tube
Aldosterone/Renin Ratio	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	5 days	**Hospital Only**	2 x EDTA required, Must be received in laboratory <4 hours. Collect samples in morning after patients have been out of bed for at least 2 hours and have been seated for 5-15 minutes.	Separated and frozen <4 hours
Alkaline Phosphatase Isoenzymes / ALP Isoenzymes	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Non haemolysed refrigerated-Do not use 10ml serum	Refrigerate
Allergy Screen	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	10 days	Yes	Allergens must be specified also known as RAST	Refrigerate
Alpha-1-Anti-Trypsin	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**	Low results will be sent to the Alpha-1 Foundation for phenotyping unless already sent in the past by MRHM.	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Alpha 1 Phenotype	Alpha1 Foundation, RCSI, Beaumont	Blood	4.9ml or 2.7ml	Serum OR EDTA	 or 	Brown or Red	10 days	**Hospital Only**	Only sent if antitrypsin result <1.0g/l	Has sample been tested for Alpha-1 Antitrypsin in Mullingar previously? if results <1.0 g/l they will automatically refer to the Alpha-1 Foundation for phenotyping by Mullingar.
Alpha Feto Protein.	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		Refrigerated. Order on Order Test / Biochemistry tab
Alpha Galactosidase A / Acid a-Glucosidase	Eurofins Biomnis	Blood	2.7 ml	EDTA / Guthrie Card		Red	4 weeks	**Hospital Only**	2 ml EDTA stored at Ambient temperature, use with Guthrie card	Ambient
Aluminium	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	8 days	**Hospital Only**	Must be received in laboratory immediately and processed <1 hour	Separate <1 hour Refrigerated
Amikacin Level (ADULT)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Clinical information and medication quantification required	Separate and freeze before sending
Amikacin Level (Paeds)	Crumlin	Blood	1.6ml	EDTA		Red		**Hospital Only**	By special arrangement only with Crumlin. Sample must arrive within 24 hours in Crumlin	Must arrive in Crumlin within 24 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Amino Acids (Blood)	Temple Street	Blood	2.7ml	Lithium Heparin		Orange	7 days	**Hospital Only**	Send to laboratory ASAP (has to be processed <2 hours) Include patients address and gender Must have TS Metabolic request form LF-META-0108	Must be separated and frozen <2 hours
Amino Acids (Urine Paeds)	Temple Street	Urine	10ml	Universal Container		Yellow	14 days	**Hospital Only**	Fasting early morning urine sample Received in laboratory <1 hour Include patients address and gender Must have TS Metabolic request form LF-META-0108 - if ASD/Autism send to Eurofins Biomnis- Requires R1 INTGB Form	Check pH, Frozen <1 hour into yellow Sarstedt Monovette. If pH >8.5 send sample but request a repeat urine sample on the patient
Amino Acids (Urine Adults)	Eurofins Biomnis	Urine	10ml	Universal Container		Yellow	7 days	**Hospital Only**	Fasting Early morning Urine ,must be received in laboratory <1 hour, R1-INTGB Amino acid-Organic Acid FORM REQUIRED-DOWNLOAD FROM Eurofins website	Check pH, Frozen <1 hour into T28 Tube
Aminophylline (Theophylline / Uniphyllin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Amitriptyline (AMIT)	Eurofins Biomnis	Serum	3ml	Serum		White	1 week	**Hospital Only**	Do not use tubes with separator gel. Must be received in laboratory < 4 hours. Clinical information and medication quantification required.	Separate and freeze <4 hours
Ammonia	Mullingar Biochemistry	Blood	2.7ml	EDTA		Red	1 days	**Hospital Only**	Contact lab prior to taking sample. Hand deliver sample to laboratory. Must be received in laboratory immediately as has to be processed <15 minutes	Separate and Freeze plasma <15 minutes Order in Netacquire Biochemistry under plasma, Must have its own individual laboratory number
Amylase (Urine)	Eurofins Biomnis	Urine	EMU or 24 hour collection	Universal Container	 or 	Yellow	4-10 days	**Hospital Only**		Laboratory- State total volume if 24 hour collection or spot early morning urine acceptable- send out in T28 tube. Refrigerate
Amyloid A	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
ANA (Anti Nuclear Abs)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Indications: SLE, RA, mixed connective tissue disease, Raunaud's, CREST. ANA will not be repeated if done within the previous 6 months	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
ANCA (Anti Neutrophil Cytioplasmic Antibodies	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Same as Vasculitis Screen	Refrigerated
Anti Neutrophil Cytoplasmic Antibodies (ANCA)	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Same as Vasculitis Screen	Refrigerated
Androgen	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4-8 days	Yes	Eurofins Processed as DHEAS, Testosterone and Delta Androstenedione. ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Refrigerated
Androstenedione	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-8 days	Yes		Refrigerated
Angelman Syndrome	Crumlin	Blood	2x2.7ml , 2 x Li hep	EDTA / Lithium Heparin	 or 	Red / Orange	56 days	**Consultant Only**	Samples for both molecular genetic testing and chromosome analysis required Clinical details and signed consent form for Genetic Analysis Request Form required 3 identifiers required.	Refrigerated
Ante Natal Antibody Screen	Mullingar Transfusion	Blood	7.5ml	EDTA		Red	5 days	**Hospital Only**	Requires Pink Blood Transfusion Laboratory Request form-Regional Hospital Mullingar Form M/BTL/101	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Angiotensin Converting Enzyme (ACE)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	Yes	Non haemolysed - must be received in laboratory immediately for centrifugation	Centrifuge immediately
Anti 21 Hyroxylase Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2-4 weeks	**Hospital Only**	Must be received in laboratory <4 hours	Separate and freeze <4 hours
Anti Acetylcholine Receptor Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must be received in laboratory <4 hours	Separate and freeze <4 hours
Anti Adrenal Gland Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1 week	**Hospital Only**	DO NOT USE 10ML TUBES	Refrigerated
Anti AMPA Antibodies	Eurofins Biomnis	CSF	500ul	Universal container	 or 	Yellow / White CSF Container	3-4 weeks	**Hospital Only**		Refrigerated
Anti AMPA Antibodies	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	3-4 weeks	**Hospital Only**		Refrigerated
Anti Amphiphysin Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Consultant Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron antibodies	Refrigerate
Anti Amphiphysin Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Consultant Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron antibodies	Refrigerate
Anti Aquaporin 4 Abs (Neuromyelitis Optica Abs)	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	3-5 weeks	**Hospital Only**	DO NOT USE 10ML SERUM TUBES	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Aquaporin 4 Abs (Neuromyelitis Optica Abs)	Eurofins Biomnis	CSF	300 µL-1ml	Universal container	 or	Yellow / White CSF Container	3-5 weeks	**Hospital Only**		Refrigerate
Anti B2 Glycoprotein 1 Abs	St James	Blood	4.9ml	Serum		Brown	7-10 days	**Hospital Only**		Refrigerated
Anti Calcium Channel Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	15 days	**Hospital Only**	Must be received in laboratory < 4 hours	Separated and frozen <4 hours
Anti Cardiolipin Antibodies	St James	Blood	4.9ml	Serum		Brown	7-10 days	Yes		Refrigerated
Anti Caspr2 Antibodies / Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Anti Caspr2 Antibodies / Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	CSF	300ul	Universal Container	 or	Yellow / White CSF Container	10 days	**Hospital Only**		Refrigerated
Anti Citrullinated Peptide Antibodies (Anti CCP)	St James	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Anti CV2 Antibodies	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron antibodies	Refrigerate
Anti CV2 Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron antibodies	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Diuretic Hormone (Blood)	Eurofins Biomnis	Blood	2 X 4ml	EDTA Aprotinin Tubes		Pink	8 days	**Hospital Only**	2 **EDTA Aprotinin precooled tubes** available from Lab Coldroom, samples must be sent to laboratory immediately and processed <1 hour. Non Hemolysed	Separated and frozen <1 hour
Anti Diuretic Hormone (Urine)	Eurofins Biomnis	Urine	10mls	24 hour Urine Collection		Brown / Yellow lid	8 days	**Hospital Only**		24 hour Urine Collection- In lab aliquot Frozen <4 hours in T28 tube
Anti DNA Antibodies (dsDNA)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Marker of SLE, only assayed if ANA positive	Refrigerated
Anti DNER Antibodies (Anti Tr Antibodies)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5-7 days	**Hospital Only**	Do not use 10ml serum tubes	Refrigerated
Anti DNER Antibodies (Anti Tr Antibodies)	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	5-7 days	**Hospital Only**		Refrigerated
Anti Factor Xa (Innohep Levels)	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	10 days	**Consultant Only**	Send to lab ASAP for Processing	Process as per Thrombophilia Screen
Anti GABA Receptor Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-4 weeks	**Hospital Only**	Part of Anti nervous synaptics antibodies	Refrigerated
Anti GABA Receptor Antibodies	Eurofins Biomnis	CSF	500ul	Universal container	 or 	Yellow / White CSF Container	3-4 weeks	**Hospital Only**	Part of Anti nervous synaptics antibodies	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti GAD/GAD65 (Glutamic Acid Dehydrogenase)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Serum not haemolysed. This test is not routinely available to general practitioners. Testing may be provided by arrangement only and following discussion with the Laboratory.	Refrigerated
Anti Ganglioside (GM1) Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Same as anti glycolipid abs	Refrigerated
Anti GM1 (Ganglioside) Abs	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Same as anti glycolipid abs	Refrigerated
Anti GBM (Glomerular Basement Membrane) Antibodies	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated.
Anti Glial Nuclear Antibody / Anti SOX1 Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	DO NOT USE 10ML SERUM TUBES	Refrigerated
Anti Glial Nuclear Antibody / Anti SOX1 Antibody	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**		Refrigerated
Anti Glutamic Acid Dehydrogenase(GAD/GAD65) Antibodies / Anti Glutamate Decarboxylase Acid Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Serum not haemolysed. This test is not routinely available to general practitioners. Testing may be provided by arrangement only and following discussion with the Laboratory.	Refrigerated
Anti Glycolipid Abs	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 weeks	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Glycoprotein 1 Antibodies	St James	Blood	4.9ml	Serum		Brown	7-10 days	**Hospital Only**		Refrigerated
Anti Histone Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1 week	**Hospital Only**		Refrigerated
Anti Hu Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Consultant Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerated
Anti IA2 (Tyrosine Phosphatase) Abs	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Non Haemolysed, This test is not routinely available to general practitioners. Testing may be provided by arrangement only and following discussion with the Laboratory.	Refrigerated
Anti Insulin Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1 week	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Anti Intrinsic Factor Antibodies (Pernicious Anaemia) Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Anti Islet Cell Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Serum not haemolysed	Refrigerated
Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies / Anti Caspr2 Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies / Anti Caspr2 Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	CSF	300ul	Universal Container	 or 	Yellow / White CSF Container	10 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Ma2 Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerated
Anti Ma2 Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerated
Anti MAG	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	14-21 days	**Hospital Only**		Refrigerated
Anti MOG (Neuromyelitis Optica) Abs	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1-2 weeks	**Hospital Only**		Refrigerated
Anti MOG (Neuromyelitis Optica) Abs	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	1-2 weeks	**Hospital Only**		Refrigerated
Anti Mulleran Hormone(AMH)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		Refrigerated
Anti MuSK	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 weeks	**Hospital Only**		Refrigerated
Anti Myeloperoxidase Antibodies (MPO)	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated
Anti Nervous Synaptic Antibodies (Includes – Anti NMDAR Anti AMPAR1 Anti AMPAR2 Anti Lgi1 Anti Caspr2 Anti GABAB Anti mGluR1 Anti mGluR5 Anti GlycR1	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 weeks	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Neuromyelitis Optica (Aquaporin 4 and MOG) Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	3-5 weeks	**Hospital Only**		Refrigerate
Anti Neuromyelitis Optica (Aquaporin 4 and MOG) Antibodies	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	3-5 weeks	**Hospital Only**		Refrigerate
Anti Neuron Antibodies (Hu, Yo, Ri, CV2, Ma2, PCA2/Cerebellum, Amphiphysin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form	Refrigerate
Anti Neuron Antibodies (Hu, Yo, Ri, CV2, Ma2, PCA2 / Cerebellum, Amphiphysin)	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form	Refrigerate
Anti NMDA (N Methyl D Aspirate) Receptor Antibodies	Eurofins Biomnis	Blood	4.0ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Anti NMDA (N Methyl D Aspirate) Receptor Antibodies	Eurofins Biomnis	CSF	500ul	Universal Container	 or 	Yellow / White CSF Container	10 days	**Hospital Only**		Refrigerated
Anti Ovarian Abs	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Do not send 10ml serum tubes	Refrigerate
Anti PCA2 / Cerebellum, Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti PCA2 / Cerebellum, Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate
Anti Phospholipid Antibodies	St James	Blood	4.9ml	Serum		Brown	7-10 days	Yes	Includes Anticardiolipin ab and B2 Glycoprotein.	Refrigerated. If sample received on Friday- centrifuge separate and send refrigerated
Anti Potassium Channel Antibodies / Anti Lgi1 Antibodies / Anti Caspr2 Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Anti Potassium Channel Antibodies / Anti Lgi1 Antibodies / Anti Caspr2 Antibodies / Anti VGKC Antibodies	Eurofins Biomnis	CSF	300ul	Universal Container	 or	Yellow / White CSF Container	10 days	**Hospital Only**		Refrigerated
Anti Ri Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate
Anti Ri Antibodies	Eurofins Biomnis	CSF	1ml	Universal Container	 or	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate
Anti Ribosome Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Anti Saccharomyces Cerevisiae Antibodies	Eurofins Biomnis	Serum	4.9mls	Serum		Brown	4-7 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Smooth Muscle Antibodies	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated
Anti SOX1 Antibody / Anti Glial Nuclear Antibody	Eurofins Biomnis	Blood	4.9m	Serum		Brown	7 days	**Hospital Only**		Refrigerated
Anti SOX1 Antibody / Anti Glial Nuclear Antibody	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**		Refrigerated
Anti Striated Muscle Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Non-haemolysed.	Refrigerated
Anti Tetanus Antibodies	St James	Blood	4.9ml	Serum		Brown	21 days	Yes		Refrigerated
Anti Thrombin III	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	8 weeks	**Consultant Only**	Also part of Thrombophilia Screen. Send to lab ASAP for Processing as per Factor Assay. Needs Thrombophilia Request Form (St James Haem Form 1429) Testing for APCR, Factor V Leiden and Prothrombin gene mutation analysis requires patient genetic consent.	Process as per Thrombophilia Screen

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Thyroglobulin Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Refrigerated
Anti Thyrotropin Receptor Antibody (TRAB/Anti-TSH Receptor Antibodies)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerated
Anti Thyroid Peroxidase Antibodies (TPO)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	9 days	**Hospital Only**	TPO (Thyroid peroxidase) analysis will not be repeated if done in the previous 12 months.	Refrigerated
Anti Tr Antibodies (Anti DNER Antibodies)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Refrigerated
Anti Tr Antibodies (Anti DNER Antibodies)	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**		Refrigerated
Anti tTg (Tissue Transglutaminase Antibodies)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	7 days	Yes	Part of Coeliac screen	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti TSH Receptor Abs (Anti Thyrotropin Receptor Antibody/ (TRAB)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerated
Anti Tyrosine Phosphatase (IA2) Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Non Haemolysed, This test is not routinely available to general practitioners. Testing may be provided by arrangement only and following discussion with the Laboratory.	Refrigerated
Anti VGKC Antibodies / Anti Caspr2 Antibodies / Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies /	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Anti VGKC Antibodies / Anti Caspr2 Antibodies / Anti Lgi1 Antibodies / Anti Potassium Channel Antibodies /	Eurofins Biomnis	CSF	300ul	Universal Container	 or 	Yellow / White CSF Container	10 days	**Hospital Only**		Refrigerated
Anti Yo Antibody	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Anti Yo Antibody	Eurofins Biomnis	CSF	1ml	Universal Container	 or 	Yellow / White CSF Container	7 days	**Hospital Only**	Must include R60-INTGB-FRC Form Part of Anti Neuron Antibodies Refrigerate	Refrigerate
AquAporin Antibodies	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	2 weeks	**Hospital Only**		Refrigerated
Arbovirus	NVRL	Blood	4.9ml	Serum		Brown	1 week	**Hospital Only**	By arrangement, need travel history and state if yellow fever vaccine received. ***Screen:** West Nile Virus, Japanese Encephalitis Virus, Yellow Fever, Dengue Virus, Tick Borne Encephalitis Virus.	Refrigerated
Arsenic (Blood)	Eurofins Biomnis	Blood	2x 2.7ml	Lithium Heparin		Orange	4 weeks	**Hospital Only**	By special arrangement only- please contact the laboratory.	Refrigerated
Arsenic (Urine)	Eurofins Biomnis	Urine	10ml	Yellow Container		Yellow	1 month	**Hospital Only**	By special arrangement only- please contact the laboratory	Refrigerated
Ascorbic Acid (Vitamin C)	Eurofins Biomnis	Blood	2 x 2.7ml	Lithium Heparin		Orange	10 days	**Hospital Only**	Must be received in laboratory immediately and processed <20 minutes. Protect from Light. Only available Mon-Wed	Separate and freeze within 20 minutes, protect from light. Can only be sent Mon-Wed to Eurofins due to shelf life of frozen Li Hep- 48 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Aspergillus	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Do not use 10ml serum tubes	Refrigerated
Aspergillus Precipitins	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Processed as Aspergillus IgG	Refrigerated
ASOT	Eurofins Biomnis	Serum	4.9mls	Serum		Brown	2-3 days	Yes		Refrigerated
Astrovirus	NVRL	Stool	2-5g	Universal Container		Blue	5 days	**Hospital Only**	By arrangement only	Refrigerated
Atypical Pneumonia Screen	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	14 days	**Hospital Only**	Mycoplasma, Chlamydia , Q Fever Phase 2	Refrigerated
Auto Antibodies	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Includes: Anti-Nuclear Antibodies, Anti-Smooth Muscle Antibodies, Anti-Mitochondrial Antibodies, Anti-Liver Kidney Microsomal Antibodies and Gastric Parietal Cell Antibodies	Refrigerated
Autoimmune Encephalitis Panel	St James	Serum		Serum		Brown	21 days	**Hospital Only**		Refrigerated
Autoimmune Encephalitis Panel	St James	CSF	200ul	CSF	 or 	Yellow / White CSF Container	21 days	**Hospital Only**		Refrigerated
Avian Precipitins	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 weeks	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
B Cells / T Cells	St James	Blood	2 x 2.7ml	EDTA Whole Blood		Red	By Arrangement 2-4 days	**Hospital Only**	Whole blood at ambient temperature - to be processed within 24 hours by arrangement only - Samples received Mon-Thurs only, 1 sample sufficient for Paeds Send to lab ASAP for Processing	Ambient Temperature, Has to be received in SJH within 24 hrs. Send FBC Report
B Streptococci PCR	Temple Street	Blood	2.7ml	EDTA		Red	1 day	**Hospital Only**	Include patients address and gender Must use TS request form IMSRL Form	Refrigerate if delay in transportation
B Streptococci PCR	Temple Street	CSF	0.5ml	Universal	 or 	Yellow / White CSF Container	1 day	**Hospital Only**	Include patients address and gender Must use TS request form IMSRL Form	Refrigerate if delay in transportation
B12	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes	If ordered without consultant - Form-M/CC/58 request form must be completed	Refrigerated
B2 Glycoprotein	St James	Blood	4.9ml	Serum		Brown	7-10 days	**Hospital Only**	Requires Clinical Details	Refrigerated
B2 Glycoprotein 1	St James	Blood	4.9ml	Serum		Brown	7-10 days	**Hospital Only**	Requires Clinical Details	Refrigerated
B2 Microglobulin (B2M)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**		Refrigerated
B-ALL Minimal Residual Disease (MRD) Panel	St James	Blood	3x2.7ml	EDTA		Red	10-15 days	**Consultant Only**	Flow Cytometry Dept. Part of minimal residual disease panel(MRD) Mon-Thurs only	Refrigerate. Must be received in SJH <24 hours
Bartonella (Cat scratch)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
BCR-ABL Transcripts (for CML)	St James	Blood	3 x 2.7ml	EDTA		Red	10-15 days	**Consultant Only**		Refrigerate. Must be received in SJH <24 hours
Bence Jones Protein (Light Chain Assay)(BJP)	Mullingar Immunology	Urine	10mls	Universal Container		Yellow	3-5 days	Yes	Early morning spot urine or aliquot from 24 hour Urine	Refrigerated
Beta Crosslaps (Bone Biomarker / Ospeoporsis Screen)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**	Fasting morning sample, Must be received in laboratory <4 hours, non haemolysed sample. ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days. For follow up testing, take at same time before taking the sample.	Separated and frozen <4 hours
Beta D Glucan (Aspergillis)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Must be received in laboratory <4hrs.	Centrifuge sample, Serum can be separated in sterile condition and frozen or centrifuged and frozen whole <4 hours
Bicarbonate (HC03)	Hospital	Blood						**Hospital Only**	Done on Blood gas	POC
Bile Acids (Blood)	Coombe Hospital	Blood	4.9ml	Serum		Brown	5 days	Yes	Must be fasting sample with 3 identifiers required	Separated and frozen

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Bile Acids (Blood)	Coombe Hospital	Blood	4.9ml	Lithium Heparin		Orange	5 days	Yes	Must be fasting sample with 3 identifiers required	Separated and frozen
Biotin (Vitamin B8/H)	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	2-3 weeks	**Hospital Only**	Do not use tubes with phase separator. Must be protected from light.	Refrigerated
Biotinidase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 weeks	**Hospital Only**	Must to be received in laboratory <1 hour, need Eurofins Biomnis Metabolic Biochemistry Form R26-INTGB available on website	Separated and frozen <1 hour
Blood Gas (ABG/VBG)	Hospital	Blood						**Hospital Only**	Point of Care	
Bone Biomarker (Paeds)	St Vincents	Blood and Urine	3x 1.1ml and 250ml	Serum and Urine Container	 and 	Brown and Yellow	4 weeks	**Hospital Only**	Contact lab for information on sampling. Serum taken on ice: Must be received in laboratory <1 hour Includes – Osteocalcin (N-Mid), Total PINP, CTX-1, 25 (OH) Vit D and PTH – Bone ALP – Urine: Record Total Volume . Refer to external folder for guidelines.	Separate and freeze <1hr into 2 aliquots 1 x aliquot Includes – Osteocalcin (N-Mid), Total PINP, CTX-1, 25 (OH) Vit D and PTH – Min Volume = 1.5ml 1 x aliquot for Bone ALP – Min Volume = 0.6ml Urine: Record Total Volume Aliquot urine into 4 tubes, freeze at -20°C Refer to external folder.
Bordetella Pertussis (Whooping Cough) Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Bordetella Pertussis (Whooping Cough) PCR	Crumlin	Swab		Pertussis swabs		Blue	5 days	Yes	Contact Microbiology Lab for special Swab	
Borrelia Burgdorferi (Lymes Disease) Serology	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Brucella	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
c ANCA	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Part of ANCA screen only tested if ANCA positive and requested	Refrigerated
C Peptide Blood	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
C Peptide Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / Yellow lid	3 days	**Hospital Only**		Frozen <4 hour in lab, no preservatives, State total volume, aliquot into T28 Tube
C1q Complement Fraction	Eurofins Biomnis	Serum	4.9ml	Serum		Brown	1 week	**Hospital Only**	Non Haemolysed Specimens. Must be received in lab within <4 hours	Separated and frozen <4 hours
C1 Esterase Inhibitor	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
C1 Esterase Inhibitor Functional Assay	Eurofins Biomnis	Blood	4.9ml AND 2x2.7ml	Serum and Sodium Nitrate	 and 	Brown AND Green	4 weeks	**Hospital Only**	Must be received in laboratory <3 hours.	2ml Na cit plasma frozen <3 hours. 3ml Serum frozen

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
C282Y (Haemachromatosis Genetic Test)	Mullingar Biochemistry	Blood	2 x 2.7ml	EDTA		Red	28 days	Yes	Must have: % Transferrin saturation > 45% and/or first degree relative C282Y homozygote. Consent form required Form - M/M/32	Refrigerated
C3 (Complement)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated
C4 (Complement)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated
CA 15.3	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**	Do not request tumour markers for health screening. Appropriate clinical details required.	Refrigerated
CA 19.9	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**	Do not request tumour markers for health screening. Appropriate clinical details required.	Refrigerated
CA 125	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**	Do not request tumour markers for health screening. Appropriate clinical details required.	Refrigerated
CAL R	St James	Blood	3 X 2.7mls	EDTA		Red	10-15 days	**Hospital Only**		Refrigerate
Calcidiol	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes	Same as vitamin D3	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Calcitonin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Must be received in laboratory <4 hours Fasting sample in the morning ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Separated and frozen <4 hours
Calprotectin	Eurofins Biomnis	Stool	at least 20g	Universal Container		Blue	5 days	Yes		Refrigerated
Campylobacter Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Carbamazepine (Tegretol)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Carnitine (Total & Free)	Eurofins Biomnis	Blood	2x2.7ml	Lithium Heparin		Orange	21 days	**Hospital Only**	Fasting sample, Must be received in laboratory and processed <1 hour If part of Newcastle Profile please contact the laboratory. Requires (R26-INTGB : Metabolic Biochemistry- available to download from Eurofins Biomnis website)	Separated and frozen <1 hour
Cat Scratch (Bartonella)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Catecholamines (Adult) Blood	Eurofins Biomnis	Blood	2 x 2.7ml	Lithium Heparin		Orange	7 days	Yes	Must be received in laboratory and processed <1 hour. 2 samples required for this test Ideally taken on fasting subject after 30mins rest period	Separated and frozen <1 hour
Catecholamines (Adult) Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / yellow lid	5 days	Yes	Refrigerate during collection period, Sent it lab <4 hours of end of collection. Do not perform sampling within menstrual cycle	24 hour Urine. In laboratory, Acidify to pH 2-3. Specify Total Volume, aliquot into T28 Tube, frozen <4 hours
Catecholamines (Children < 14yrs)	Beaumont	Urine	10mls	Universal Container		Yellow	3 days	Yes	Must be received in laboratory <1 hour	Spot urine sample Acidify to pH 4 within 1 hour
Catecholamines - Methoxylated Derivatives (Metanephrines)	Eurofins Biomnis	Blood	2x2.7ml	Lithium Heparin		Orange	7 days	Yes	Must be received in laboratory and processed <1 hour. 2 samples required for this test , Ideally taken on fasting subject after 30 minutes rest period	Separated and frozen <1 hour
Catecholamines - Methoxylated Derivatives (Metanephrines)	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / yellow lid	7 days	Yes	Refrigerate during collection period, Sent it lab <4 hours of end of collection. Do not perform sampling within menstrual cycle	24 hour Urine. In laboratory, Acidify to pH 2-3. Specify Total Volume, aliquot into T28 Tube, frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
CD 4 /CD8 (T Cell Subset)	St James	Blood	3 x 2.7ml	EDTA		Red	By Arrangement 2-4 days	**Hospital Only**	Whole blood at ambient temperature - to be processed within 24 hours by arrangement only - Samples received Mon-Thurs only, 1 sample sufficient for Paeds Send to lab ASAP for Processing	Ambient Temperature, Has to be received in SJH within 24 hours. Send FBC Report
CEA (Carcinoembryonic Antigen)	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes	Clinical indication: Follow-up and monitoring of patients with colorectal cancer. Not recommended for diagnosis or screening Do not request tumour markers for health screening.	Refrigerated
Cellcept / Mycophenolate / Mycophenolate Mofetil (MMF)	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	3 days	**Hospital Only**	Refer to Eurofins Biominis test guide for documents to download Specific Clinical Information Forms - R13-INTGB R31-INTGB	Refrigerated
Ceruloplasmin	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**		Refrigerated
CGH (Comparative Genomic Hybridisation) Array	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	21 days	**Hospital Only**	Include clinical history and signed consent. Genetic Test Request Form RQF36 - available on Eurofins website	Whole blood Ambient

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
CH100	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**	Received in laboratory immediately	Send immediately to SJH, to arrive <6 hours and before 16:00. If this is not possible, separate and freeze.
Chagas Disease (Trypanosoma Cruzi)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Clinical information required	Refrigerated
Chicken Pox (Varicella Zoster Virus) Blood	NVRL	Blood	4.9ml	Serum		Brown	3-7 days	Yes		Refrigerated
Chikungunya	NVRL	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Chlamydia/Gonorrhoea Cobas	Mullingar	Swab		Cobas		Yellow Cobas Swab	7 days	Yes	This swab is suitable for Female Chlamydia & Gonorrhoea	This swab is suitable for Female Chlamydia & Gonorrhoea
Chlamydia/Gonorrhoea-Cobas	Mullingar	Urine		Cobas		Yellow Cobas Urine	7 days	Yes	This swab is suitable for Urine Chlamydia & Gonorrhoea screening for male and female patients	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Chlamydia/Gonorrhoea	NVRL	Swab		Aptima Collections		see website for swabs	7 days	Yes	Suitable for: Chlamydia trachomatis, Neisseria gonorrhoea, Trichomonas vaginalis and Mycoplasma genitalium; ORANGE: Multitest (multisite); PURPLE (Unisex): Endocervical/Urethral swabbing;	Refrigerated
Chlamydia/Gonorrhoea	NVRL	Urine		Aptima Collections		see website for swabs	7 days	Yes	YELLOW: Urine – Suitable for: Chlamydia trachomatis, Neisseria gonorrhea, Trichomonas vaginalis and Mycoplasma. Ensure urine specimen containers are filled to the correct volume as indicated by the black lines on the Aptima Tube. Over- or under-filled Aptima tubes will not be processed.	Refrigerated
Chlamydia Pneumoniae	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only. Available by arrangement only following discussion with the Consultant Microbiologist**	Non-STD	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Chlamydia Psittaci	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5-10 days	**Hospital Only. Available by arrangement only following discussion with the Consultant Microbiologist**		Refrigerated
Cholinesterase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	Yes	Non Haemolysed Specimens	Refrigerated
Chromogranin A	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	Yes	Must be received in laboratory and processed < 4 hours	Separated and frozen <4 hours
Chromosome Analysis of Solid Tissue/Product of Conception	Eurofins Biomnis	Product of conception / placenta / cord / faetal tissue		CVS/POC transport medium		CVS/POC transport medium	21 days	**Hospital Only**	Clinical details required Container available from Laboratory coldroom Eurofins Biomnis Consent Form required RQF36	
Chromosome Studies (Cytogenetics / Karyotype) < 5 year	Crumlin	Blood	2 x 2.7ml	Lithium Heparin		Orange	21 days	**Hospital Only**	Three patient identifiers required Need clinical details and signed Consent Form- Crumlin Request for Genetic Analysis	
Chromosome Studies (Cytogenetics / Karyotype)- > 5 year	Eurofins Biomnis	Blood	2 x 2.7ml	Lithium Heparin		Orange	28 days	**Hospital Only**	Available Mon-Wed only. Need clinical details and signed Eurofins Biomnis Genetic Test Request, Information & Consent Form - RQF36 – available on website	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Citrate	Eurofins Biomnis	Urine		24 hour Urine Container		Brown / yellow lid	7 days	**Hospital Only**	Tested excluding any Urinary tract infection. Store urine in a cool place during collection.	Record volume, Shake the urine before aliquoting into a T28 TUBE (do not overfill) Frozen <4 hours. Specify diuresis
CK (Creatine Kinase) Isoenzymes	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**	Non haemolysed	Refrigerated
CK MB fraction	St James	Blood	4.9ml	Serum		Brown	1-2 days	**Hospital Only**	Test only available to coronary care wards - in SJH. Contact SJH for availability.	Refrigerated
CLL Minimal Residual Disease	St James	Blood	3x2.7ml	EDTA		Red	21 days	**Hospital Only**	Flow Cytometry Dept. Part of minimal residual disease panel(MRD)	Samples must arrive in SJH before 15:00 Friday
Clobazam	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with separator gel. Must be received in laboratory and processed <4 hours. Include medication quantification and clinical details	Separated and frozen <4 hours
Clomipramine	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with separator gel. Must be received in laboratory and processed <4 hours. Include medication quantification and clinical details	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Clonazepam	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with separator gel. Must be received in laboratory and processed <4 hours. Include medication quantification and clinical details	Separated and frozen <4 hours
Clozapine Levels (Clozaril)	Eurofins Biomnis	Blood	2x 2.7ml	Lithium Heparin		Orange	10 days	Yes	Do not use tubes with separator gel. Include medication quantification and clinical details	Refrigerated
CMV (Cytomegalovirus) Blood	NVRL	Blood	4.9ml	Serum		Brown	3-7 days	**Hospital Only**		Refrigerated
CMV (Cytomegalovirus) Urine	NVRL	Urine	10mls	Universal container		Yellow	3-7 days	**Hospital Only**		Refrigerated
CMV (Cytomegalovirus) PCR	NVRL	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**		Refrigerated OR Separate and Freeze if it will take <24 hours to get to NVRL
Coeliac Screen	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3 days	Yes	Includes: Tissue transglutaminase (TTG) and Endomycial antibodies (EMA)	Refrigerated
Cold Agglutinins	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	7 days	**Hospital Only**	EDTA whole blood ambient temperature.	ambient temperature
Colomycin	Crumlin	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Serum 1.5ml blood. Taken pre dose for pre levels, one hour post dose for post levels	Refrigerated
Connective Tissue Disorder / Antibody Screen	St James	Blood	4.9ml	Serum		Brown	7-9 days	Yes		Refrigerate. If delay with sending-centrifuge and separate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Connexin 26 or Connexin 30	Crumlin	Blood	2.7ml	EDTA		Red	3-4 weeks	**Hospital Only**	Three patient identifiers required Need clinical details and signed Consent Form	
Copper Blood	Eurofins Biomnis	Blood	4.9ml/2.7ml	White Serum / Lithium Heparin	 or 	White or orange	5 days	Yes	Non haemolysed sample. Do not use tube with phase separator. Must be received and processed in lab <1 hour	Separate within 1 hour, Refrigerated
Copper Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown/ Yellow lid	7 days	Yes	Clinical Indications required	Specify volume, send aliquot in T28 Tube, Refrigerate
Corona Virus	NVRL	Resp Secretions / BAL / NPA		Universal Container			5 days	**Hospital Only**		Refrigerated
Cortisol Blood	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Ensure time taken is noted on sample and request form	
Cortisol Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown/ Yellow lid	7 days	**Hospital Only**		Specify volume, send aliquot in T28 Tube, Refrigerate
Cortisone Blood	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	15 days	**Hospital Only**		Refrigerated
Cortisone Urine	Eurofins Biomnis	Urine	10mls	24 hour Urine Container		Brown/ Yellow lid	15 days	**Hospital Only**		Specify volume, send aliquot in T28 Tube, Refrigerate
Cotinine	Eurofins Biomnis	Urine	10mls	Universal Container		Yellow	4 days	**Hospital Only**	Spot urine sample Refrigerated	Aliquot into T28 Tube Refrigerated
Coxiella Burnetti (Q Fever)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
CTX - C Terminal Telopeptide (Osteoporsis Screen Beta Crosslaps / Bone Biomarker)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**	Fasting morning sample, Must be received in laboratory <4 hours, non haemolysed sample. ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days. For follow up testing, take at same time before taking the sample.	Separated and frozen <4 hours
Coxsackie Virus (Enterovirus)	NVRL	Stool or CSF OR SWAB	20g / 500µl	Universal container or Viral Swab	 or  or  or 	Blue Container or Yellow or Pink	7 days	**Hospital Only**		Order Enterovirus on LIS
CSF Viral Screen (Altona)	NVRL	CSF	500µl	Universal Container	 or 	Yellow /white	3 days	**Hospital Only**	Screen includes: HSV ½, VZV DNA, Enterovirus RNA and if <3 years old Paraechovirus	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
CSF VZV DNA	NVRL	CSF	500µl	Universal container	 or 		3-5 days	**Hospital Only**		Refrigerated
Creatine Kinase (CK) Isoenzymes	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Sample NOT Haemolysed	Refrigerated
Cryptococcal Antigen	Eurofins Biomnis	Blood or Urine/CSF/BAL	4.9ml or 1ml	Serum or Universal Container	 or  or 	Brown or Yellow	3 days	**Hospital Only**		Refrigerated - infectious, Specific transportation guidelines
CSF PCR Bacteria	Temple Street PCR Lab	CSF	0.5ml minimum	Universal Container	 or 	Yellow /white	2 days	**Hospital Only**	Include patients address and gender. Use Temple Street Request form	
CSF PCR Virus	NVRL	CSF	0.5ml minimum	Universal Container	 or 	Yellow /white	3 days	**Hospital Only**	Indicate specific viruses	Refrigerated
Cyclosporin (Neoral)	Beaumont	Blood	2.7ml	EDTA		Red	10 days	Yes	Whole blood- Trough level sample	
Cystic Fibrosis	Crumlin	Blood	2X 2.7ml	EDTA		Red	6-8 weeks	**Hospital Only**	Signed Consent form required- Crumlin Request for Genetic Analysis Form Three patient identifiers required.	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Cystine Blood	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	14 days	**Hospital Only**	Must be received in laboratory immediately and processed < 1hr, needs R1-INTGB : Amino Acids - Organic Acids request form or Temple St form	Separated and frozen <1 hour, must have request from
Cystine Urine	Eurofins Biomnis	Urine	10mls	Universal Container		Yellow	7-14 days	**Hospital Only**	Early Morning Urine received < 1 hour. R1-INTGB : Amino Acids - Organic Acids form or Temple St request form	Check pH. Separated and frozen into T28 Tube <1 hour, must have request from.
Cytogenetics / Chromosome Studies / Karyotype (> 5yr)	Eurofins Biomnis	Blood	2x2.7ml	Lithium Heparin		Orange	28 days	**Hospital Only**	Available Mon-Wed only. Need clinical details and signed Eurofins Biomnis Genetic Test Request, Information & Consent Form	
Cytomegalovirus (CMV) PCR	NVRL	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**		Refrigerated OR Separate and Freeze if it will take <24 hrs to get to NVRL
Cytomegalovirus (CMV) Blood	NVRL	Blood	4.9ml	Serum		Brown	3-7 days	Yes		Refrigerate
Cytomegalovirus (CMV) Urine	NVRL	Urine	10mls	Universal container		Yellow	3-7 days	**Hospital Only**		Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Cytology	Tullamore Cytology						5-12 days	**Hospital Only**	Please send completed MRH Tullamore Histopathology form, Refer to Histopathology Section in Pathology Department User Manual, MRH Tullamore for sample collection details or contact Cytology lab MRH Tullamore.	
Cytology Liquid- Thin Prep	Eurofins Biomnis			Thin Prep Container		White		**Consultant Only**	Needs Eurofins Biomnis Cytology Test Request Form. Cervical cytology (Thin prep PAP Test) and High Risk HPV DNA combined tests - HPVNL. For GPs samples for women aged 25-65 should be sent directly to Cervical Check. Samples for women outside this age group and who are not registered with Cervical Screening Program should be referred directly by GP to Eurofins Biomnis.	
Delta F508 (Cystic Fibrosis)	Crumlin	Blood	2X 2.7ml	EDTA		Red	6-8 weeks	**Hospital Only**	Signed Consent form required- Crumlin Request for Genetic Analysis Form Three patient identifiers required.	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Dementia Screen	Various	Blood and Urine		1 x EDTA* AND 4 x Serum AND 1 x Fluroide	 and  and  and 	Red Brown and Yellow	7 days	Yes	Please request: FBC, ESR, U+E, LFT, CRP, TFT, Fasting lipids, Fasting Glucose, *HbA1c (if diabetic), Bone profile, Iron profile, B12 + Folate, Vit D, T Palladium, PSA (men)	
Delta Aminolevulinic Acid (Porphobilinogen)	Eurofins Biomnis	Urine	10mls	Universal Container		Yellow	7 days	Yes		Early morning urine Keep away from light. Do not acidify. Refrigerate
Dengue Virus	NVRL	Blood	4.9ml	Serum		Brown	1 week	**Hospital Only**	By arrangement, need travel history and state if yellow fever vaccine received.	Refrigerated
Deximethesone (Cortisol)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	10 days	Yes	Baseline sample taken at midnight. Post dex sample at 08:00	
DHEA (Dehydroepiandrosterone) Blood	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerate
DHEAS Dehydroepiandrosterone Sulphate	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerate
DHT - Dihydrotestesterone	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**		Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Digoxin / Digitoxin (Lanoxin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	Refrigerate up to 48 hours if greater frozen -20°C up to 7 days
Diphteria IgG	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
DNA Analysis (Molecular Genetics)	Crumlin	Blood	2 x 2.7ml	EDTA		Red	21 days	**Consultant Only**	Clinical details and signed consent form required Three identifiers required	
Dopamine (Included in Catecholamines) Blood	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	7 days	Yes	Must be received in laboratory and processed <1 hour. 2 samples required for this test. Ideally taken on fasting subject after 30 minutes rest period	Separated and frozen <1 hour
Dopamine (Included in Catecholamines) Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / yellow lid	7 days	Yes	Refrigerate during collection period, Sent it lab <4 hours of end of collection. Do not perform sampling within menstrual cycle	24 hour Urine. In laboratory, Acidify to pH 2-3. Specify Total Volume, aliquot into T28 Tube, frozen <4 hours
Dopamine (Included in Catecholamines) Blood	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	7 days	Yes	Must be received in laboratory and processed <1 hour. 2 samples required for this test. Ideally taken on fasting subject after 30 minutes rest period	Separated and frozen <1 hour
Downs Syndrome	Crumlin	Blood	2 x 2.7ml	Lithium Heparin		Orange	21 days	**Consultant Only**	Need Clinical Details and signed Consent Form Three Patient Identifiers required	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
DPD Deficiency Testing (Dihydropyrimidine Dehydrogenase Deficiency)	Eurofins Biomnis	Whole Blood	2xLi Hep Plasma	Lithium Heparin		Orange	7 days	**Hospital Only**	The blood must be drawn before any chemotherapy or at least 1 week after the last course of treatment. Consent form required – D23-INTGB available on Eurofins Biomnis website	Refrigerated
EBV (Epstien Barr Virus)	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
EBV PCR	NVRL	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**		Freeze plasma ASAP
Echinococcus (Tapeworms)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Elastase	Eurofins Biomnis	Stool	20g	Universal Container		Blue	10 days	**Hospital Only**	Fresh sample.	Fresh sample, refrigerated
Electrophoresis – Haemoglobin	St James	Blood	2.7ml and 4.9ml	EDTA and serum		Red	14 days	**Hospital Only**	1 x EDTA and 1 x serum required.	Refrigerate. Also send a copy of FBC report plus stained slide
ELF Enhanced Liver Fibrosis	Eurofins Biomnis	Blood	4.9ml	Serum		Brown		**Hospital Only**		Refrigerated
Elsicarbazepine (Zebinex)	Eurofins Biomnis	Blood	4.9ml	Serum		White	10 days	Yes	Do not use tubes with separator gel. Must be received in laboratory within < 4 hours. Clinical information and medication quantification required.	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
EMA(IgA Endomysial Antibodies)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3 days	Yes	Part of coeliac screen	
EMA / Erythrocyte Membrane Antigen Analysis [Hereditary Spherocytosis) Paeds	Crumlin	Blood	1.6ml	EDTA		Red	5 days	**Hospital Only**	Samples <7 days old are unsuitable for analysis	Send FBC and Blood film To be tested < 3 days
ENA (Extractable Nuclear Antigen)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	10-20 days	**Hospital Only**	Only sent if ANA Positive, GP ENA requests will be only be tested (in an external lab) on ANA positive adult patients with titre of 1:160, and on paediatric patients with titre of 1:80, (if not done within the previous 12 months). All ENA requests from hospital consultants will be referred for testing.	Refrigerated
Encephalitis (Autoimmune) Panel	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**		Refrigerated
Encephalitis (Autoimmune) Panel	St James	CSF	200ul	CSF	 or 	Yellow / White CSF Container	21 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Elsicarbazepine (Zebinex)	Eurofins Biomnis	Blood	4.9ml	Serum		White	10 days	Yes	Do not use tubes with separator gel. Must be received in laboratory within < 4 hours. Clinical information and medication quantification required.	Separated and frozen <4 hours
Enterovirus (Molecular Qualitative)	NVRL	Stool or Throat Swab or vesicular fluid (HFMD)	5-10g 500ul	Universal container or Viral Swab or Universal Container	 or  or 	Yellow or Pink or Yellow	3 days	**Hospital Only**	Stool: 5-10g CSF: 500ul Pink Viral Throat Swab	Refrigerated
Eosin 5 Maleimide Staining Erythrocytes (Osmotic Fragility Test/Hereditary Spherocytosis)	St James	Blood	2.7ml	EDTA		Red	By Arrangement- 7 days	**Consultant Only**	Contact Haematologist Send to lab ASAP for Processing	Fresh EDTA anti-coagulated blood required (analysis must be within 24 hours of collection). FBC and blood film required. Please phone ahead to SJH when sending test.
Epanutin (Phenytoin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Epilim (Sodium Valproate/Valporate)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		Order on Biochemistry order tab
Erythropoietin (EPO)	St James	Blood	4.9ml	Serum		Brown	14 days	**Hospital Only**	Must be received in laboratory <4 hours	Separated and Frozen <4 hours
Estradiol	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Ethosuximide (Zarontin)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Must be received in laboratory <4 hours R13-INTGB Form required	Separated and frozen <4 hours
Extractable Nuclear Antigen (ENA)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	10-20 days	**Hospital Only**	Only sent if ANA positive SM/RNP, SCL70 and Jo-1 antibodies	
Extrinsic Allergic Alveolitis (Precipitins / Farmers Lung)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
Extrinsic Factor Screen	National Centre for Hereditary Coagulation Disorders	Blood	3 X 2.7mls	Sodium Citrate		Green	10 days	**Consultant Only**	Process as per Thrombophilia Screen	Process as per Thrombophilia screen
Factor Assays (Adult)	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	21 days	**Hospital Only**	Send to Lab ASAP for processing	Process as per Thrombophilia. If urgent samples contact NCHCD. Arrange transport via taxi. Need to be sent by 12:30
Factor Assays (<16 years)	Crumlin	Blood	3 x 3ml	Sodium Citrate		Green	28 days	**Hospital Only**	Send to lab ASAP for Processing Process as per Thrombophilia	Processed as per Thrombophilia

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Factor V Leiden	National Centre for Hereditary Coagulation Disorders	Blood	2 x 2.7ml and 2 x 3ml	1 EDTA and 2 Sodium Citrate	 and 	Red and Green	8 weeks	**Hospital Only**	Also part of Thrombophilia Screen. Send to lab ASAP for Processing as per Factor Assay. Needs Thrombophilia Request Form (St James Haem Form 1429)Testing for APCR, Factor V Leiden and Prothrombin gene mutation analysis requires patient genetic consent.	Send to lab ASAP for Processing. Process as per Thrombophilia
Factor Xa	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	5 days	**Hospital Only**	Send to lab ASAP. The type of heparin treatment must be specified in clinical details field.	Send to lab ASAP for Processing Process as per Thrombophilia
Factor Xa for Patients on Innohep	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	3 days	**Hospital Only**	Send to lab ASAP for Processing Process as per Thrombophilia	
Faecal Elastase	Eurofins Biomnis	Stool	min 20g	Universal Container		Blue	10 days	**Hospital Only**	Fresh sample, refrigerated	Fresh sample, refrigerated
Fanconi Screen	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	By prior arrang ement 10 days	**Hospital Only BY ARRANGEMENT**	EDTA Whole blood Ambient Require clinical details, FBC Report and Cytogenitic Consent Form B13- INTFR	AMBIENT Temperature
Farmers Lung (Extrinsic Allergic Alveolitis / Precipitins)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Fatty Acids (Free Non Esterified)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	15 days	**Hospital Only**	Fasting sample. Must be received in laboratory <1 hour	Separated and frozen <1 hour
Fatty Acids with Very Long Chains	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA or Lithium Heparin	 or 	Red	3 weeks	**Hospital Only**	Must be received in laboratory <1 hour	Separated and frozen <1 hour
FDP (Fibrin Degredation Products)	Eurofins Biomnis	Blood	3ml	Sodium Citrate		Green	10 days	**Hospital Only**	Must be received in laboratory <4 hours	Freeze <4 hours
Felbamate	Eurofins Biomnis	Blood	4.9ml	Serum		White	10 days	Yes	Do not use tubes with phase separator, received in laboratory <4 hours Requires R13-INTFR	Separated and frozen <4 hours
Ferritin	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		Refrigerate
FIP 1L1- PDG FRA Transcripts	Wessex	Blood	4 x 2.7ml (2 li hep and 2 EDTA)	Lithium Heparin and EDTA	 and 	Orange and red	30 days	**Hospital Only**	2xLiHep / 2xEDTA Whole Blood Ambient	AMBIENT Temperature, Consultant Haematologist referrals send to Prof N Cross, Wessex Regional Genetics Laboratory, Sailsbury NHS Foundation Trust, Sailsbury, Wiltshire, UK SP2 8BJ 0044 01722429080

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
FISH Analysis	Crumlin	Blood	2.7ml	2x Lithium Heparin		Orange		**Hospital Only**	Signed Consent form required- Crumlin Request for Genetic Analysis Form Three patient identifiers required.	Room Temperature
FISH Cytogenetics CLL	Crumlin	Blood	2.7ml	2 x Lithium Heparin		Orange		**Hospital Only**	Signed Consent form required- Crumlin Request for Genetic Analysis Form Three patient identifiers required.	
FK506 –Tacrolimus (Prograf)	St Vincents	Blood	2.7ml	EDTA		Red	3-5 days	Yes	Draw specimens before next Dose (Trough sample) MUST include clinical details. Specify if Transplant patient Store at room temp	Send at Ambient Temperature Send to Transplant Centre Hospital Laboratory
Flecainide	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Received in laboratory <4 hours Sample prior to administration R14-INTGB Form required	Separated and frozen<4 hours
Flow Cytometry (Immunophenotyping – Peripheral Blood)	St James	Blood	2 x 2.7ml	EDTA		Red		**Consultant Only**	Ambient room temperature and received in SJH within 24 hours	Ambient room temperature and received in SJH within 24 hours
Flow Cytometry (FMH Confirmation)	Coombe Hospital	Blood	2 x 2.7ml	EDTA		Red		**Consultant Only**	Positive Kleihauer/FMH sent for confirmation	
Folic Acid/Folate (Vitamin B9)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Follicle Stimulating Hormone (FSH)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Fragile X	Crumlin	Blood	2 x 2.7ml and 2 x 2.7ml	Lithium Heparin AND EDTA	 and 	Orange AND Red	26 weeks	**Hospital Only**	Need clinical details and signed Consent Form. Three identifiers required.	
Free T3	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	7 days	Yes		
Free T4	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Free Testosterone	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Friedreich Ataxia	Crumlin	Blood	2 X 2.7ml	EDTA		Red		**Hospital Only**	Signed Consent form required- Crumlin Request for Genetic Analysis Form Three patient identifiers required.	
Frisium (Clobazam)	Eurofins Biomnis	Blood	4.9ml	Serum		White	2 weeks	Yes	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Fructosamine	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	Yes		Refrigerated
FSH (Follicle Stimulating Hormone)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Gabapentin	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	**Hospital Only**	Do not use tubes with phase separator R13-INTGB form required, must be received in laboratory <4 hours	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
GAD/GAD65 Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Serum not haemolysed. This test is not routinely available to general practitioners. Testing may be provided by arrangement only and following discussion with the Laboratory.	Refrigerated
GAGS (Glucosaminoglycanes) Screen	Temple Street or Eurofins Biomnis See comment	Urine	5mls	Universal Container		Yellow	10 days	**Hospital Only**	Must be received in laboratory immediately. Requires Temple St Request form	check pH. Urine frozen <1 hour Requires TS request form Include full address and gender No clinical details or Autism/ASD only send to Biominis
GAGS (Mucopolysaccharide Quantitative Requests)	Willinks Lab	Urine	10mls	Universal Container		Yellow	28 days	**Hospital Only**	Only for mucopolysaccharide quantitative requests. All other GAGS go to Temple street. Keep @ RT Willinks Lab, Biochemical Genetics Unit 6th Floor Pod 1 St. Marys Hospital Oxford Rd., Manchester, M13 9WL 0044 (0)16 1701 2138 / 0044(0)16 1701 2137 (Main) 0044 (0)16 1276 6506 (Genetics Department)	
Galactomannan	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Do not use 10ml tubes	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Galactitol	Miscellaneous Laboratory	Urine	5mls	Universal Container		Yellow	28 days	**Hospital Only**	Frozen Send to: Dept of Clinical Biochemistry Southmead Hospital, Bristol, BS10 5NB 0044 (0)11 7950 5050	
GALT (Galactose-1-P-UridylTransferase) (Adults)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	3 weeks	**Hospital Only**		Ambient temperature
GALT (Galactose-1-P-UridylTransferase) (Paediatrics)	Temple Street	Blood	2 X 2.7ml	Lithium Heparin		Orange	6 weeks	**Hospital Only**	Can only be taken on Monday/Tuesday. Requires TS request form. Include patients address and gender. Contact Temple Street before testing	
Gastrin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**	Must be received in laboratory <4 hours Must be a fasting sample for at least 10 hours	Separated and frozen <4 hours
GATA-Binding Factor 1 (G.A.T.A -1) Mutations	Miscellaneous Laboratory	Blood	2.7ml	EDTA		Red	28 days	**Hospital Only**	Store at 4°C Send to: Laboratory Haematology, Level 4, John Radcliffe University Hospital, Headley Way, Headington, Oxford, OX3 9DU 0044 (0)18 6557 2824 (Haematology Laboratory) 0044 (0)30 0304 7777 (Switch)	
Genetic Screen	Crumlin	Blood	2 x 2.7ml	Lithium Heparin		Orange	21 days	**Hospital Only**	Need clinical details Signed consent 3 identifiers - specify screen	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Gibert Syndrome	St James	Blood	2 x 2.7ml	EDTA		Red	21 days	**Hospital Only**	Must be discussed with the Biochemistry Clinical Team in St James prior to taking sample. (01) 4162054 - 2 x EDTA. Requires Biochemical Genetic request form available on SJH website	Refrigerated
Glucagon	Eurofins Biomnis	Blood	2ml	EDTA-Aprotinin		Pink	14-21 days	**Hospital Only**	Non haemolysed, Received in laboratory <4 hours Tube available from Lab coldroom	Separated and frozen <4 hours
Glucose-6-Phosphate Dehydrogenase	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**	On Fridays please ensure samples arrive in laboratory before 16:00. Please send separate EDTA for FBC report	Whole blood Send with FBC results
Glucosaminoglycanes (GAGS) Screen	Temple Street or Eurofins Biomnis See comment	Urine	5mls	Universal Container		Yellow	10 days	**Hospital Only**	Must be received in laboratory and processed <1 hour Requires TS request form Include full address and gender clinical details	Check pH Urine frozen <1 hour Requires TS request form Include full address and gender No clinical details or Autism/ASD only send to Biominis
Glutathione Peroxidase	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	21 days	**Hospital Only**	Must be received in laboratory <1 hour	Separated and frozen <1 hour
Glycoslated Haemoglobin (HbA1C)	Mullingar Biochemistry	Blood	2.7ml	EDTA		Red	3 days	Yes	Send separate sample if FBC also requested	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Gonorrhoeae	NVRL	Swab or Urine		Aptima Collection	 or 		3 days	Yes	Automatically done if Chlamydia requested. Sample types can be endocervical / urethral / eye and rectal swabs Or Urine specimens in APTIMA collection Must be between lines.	Refrigerated
Group B Strep PCR	Temple Street	Blood	2.7ml	EDTA		Red	3 days	**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11:00 Mon-Fri	
Group B Strep PCR	Temple Street	Blood	1ml	CSF	 or 	Yellow / White CSF Container	3 days	**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11:00 Mon-Fri	
Growth Hormone	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	**Hospital Only**	Fasting Sample. Must be received in laboratory <4 hours	Separated and frozen <4 hours
Guthrie Test (PKU - Phenyketonuria)	Temple Street	Blood		Guthrie Card			8 days	**Hospital Only**	Cards available on maternity ward Sent directly from maternity Screen includes: Total Galactose Leucine Phenylalanine Methionine and TSH Include full address and gender	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Haemochromatosis Genetic Test (C282Y)	Mullingar Biochemistry	Blood	2 x 2.7ml	EDTA		Red	14 days	Yes	Must have: % Transferrin saturation >45% and/or first degree relative C282Y homozygote. Mullingar Consent form required	
Haemoglobinopathy - Paeds	Crumlin	Blood	1.6ml	EDTA and Serum	 and 	Red and Brown	10 days	**Hospital Only**		Send a copy of FBC report plus stained slide
Haemoglobinopathy (Haemoglobin A2/F/S) - Adults	St James	Blood	2.7ml and 4.9ml	EDTA and Serum	 and 	Red and Brown	10-14 days	Yes	1 x EDTA and 1 x serum required.	Send a copy of FBC report plus stained slide and serum sample. Requires SJH Haemoglobinopathy request form
Haemoglobin Electrophoresis	St James	Blood	2.7ml and 4.9ml	EDTA and Serum	 and 	Red and Brown	10-14 days	**Hospital Only**	1 x EDTA and 1 x serum required.	Send a copy of FBC report plus stained slide and serum sample. Requires SJH Haemoglobinopathy request form
Haemophyllis Influenza B (Serology)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7-14 days	Yes	Only for post vaccination testing	Refrigerated
Haemophillus Influenza (PCR) Temple Street Paeds	Temple Street PCR Lab	Blood	2.7ml	EDTA		Red	2 days	**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11am Mon-Fri	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Haemophillus Influenza (PCR) Temple Street Paeds	Temple Street PCR Lab	CSF	0.2-0.5ml	Universal Container	 or 	Yellow / White CSF Container	2 days	**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11am Mon-Fri	
Haemophillus Specific IgG	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**		Refrigerated. If sample received on Friday- centrifuge separate and send refrigerated
Haemophillus Vaccine Specific titres	Manchester Royal Infirmary	Blood	4.9ml	Serum		Brown	28 days	**Hospital Only**	1 serum for each test	Send to: PHE Vaccine Evaluation Unit, Manchester Medical Microbiology Partnership, Clinical Sciences Building (2nd floor, CSB2, PO Box 209) Manchester Royal Infirmary Oxford Road Manchester M13 9WL 0044 (0)16 1276 8854/8788 (Results/enquiries)
Haemosiderin	St James	Urine	10mls	Universal Container		Yellow	By Arrang ement	**Hospital Only**	Only available Mon-Thurs	To arrive in St James within 24 hours due to sample contamination
Haptoglobins	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Haloperidol	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	1 week	Yes	Requires clinical information / medication quantification	Refrigerated
HbA1c (Glycoslated Haemoglobin)	Mullingar Endocrinology	Blood	2.7ml	EDTA		Red	3 days	Yes	Send separate sample if FBC	
HCG Beta (Human Chorionic Gonadotrophin Beta Tumor Marker)	Tullamore Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes	Non pregnant, non-menopausal or males.	Refrigerated
HE4	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 days	**Hospital Only**	Sample must be received in laboratory <4 hours. ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Separated and frozen <4 hours
Helicobacter Pylori (Serology)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	Yes		Sample must be <7 days old
Helicobacter Pylori (Stool Antigen Test)	Eurofins Biomnis	Stool		Universal Container		Blue	3-5 days	Yes		Frozen <72 hours of sample collection

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Hereditary Spherocytosis (Eosin 5 Maleimide Staining Erythrocytes/Osmotic Fragility Test)	St James	Blood	2.7ml	EDTA		Red	By arrang ement	**Consultant Only**	Contact Haematologist Send to lab ASAP for Processing	Fresh EDTA anti-coagulated blood required (analysis must be within 24 hours of collection). FBC and blood film required. Please phone ahead to SJH when sending test.
Heparin Induced Thrombocytopenia (HIT)	National Centre for Hereditary Coagulation Disorders	Blood	2 X 4.9ml	Serum		Brown	By Arrang ement	**Hospital Only**	Send to lab ASAP. Requires HEPARIN INDUCED THROMBOCYTOPENI A (HIT) REQUEST FORM available on SJH website	Send to lab ASAP for Processing. Spin, separate and freeze @ -20°C. Can be sent at 4°C if being processed on the sample day. Require NCHCD Request form available in 'External blank forms' folder or Download from SJH website. Contact NCHCD 01 4162956/4162049.
Hepatitis A Antibodies	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
Hepatitis B Antibodies	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
Hepatitis B Core Antibodies	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Hepatitis B PCR (DNA Viral Load)	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes	Separate and freeze <24 hours	Refrigerated or frozen if unable to reach NVRL <24 hours
Hepatitis B Surface Antigen (HBsAg)	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
Hepatitis B Virus Viral Load	NVRL	Blood	4.9ml or 2x2.7ml	Serum or EDTA	 or 	Brown or Red	5 days	Yes		Freeze <24 hours
Hepatitis C Antibodies	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerate
Hepatitis C PCR(RNA Viral Load)	NVRL	Blood	4.9ml or 2x2.7ml	Serum or EDTA	 or 	Brown or Red	5 days	Yes		Freeze serum/plasma <24 hours
Hepatitis D Virus	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerate
Hepatitis E Antibody	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerate
Hepatitis E Virus PCR	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Separate and Freeze <24 hours
Herpes Simplex Virus 1 and 2 (HSV) Serology	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerate
Herpes Simplex Virus 1 and 2 (HSV)	NVRL	Swab		Viral Swab		Pink	7 days	Yes		Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Herpes Simplex Virus 1 and 2 (HSV) DNA (Altona)	NVRL	CSF		Universal	 or 		5 days	**Hospital Only**		Refrigerate
HHV 6 (Human Herpes Virus 6) DNA (Altona)	NVRL	CSF		Universal	 or 	Yellow / White CSF Container	5 days	**Hospital Only**	Immunocomprised adults or children <3 years	Refrigerate
HHV 6 (Human Herpes Virus 6) DNA (Altona)	NVRL	Blood		EDTA		Red	5 days	**Hospital Only**	Immunocomprised adults or children <3 years	Refrigerate
Histology	Tullamore Histology	Specimen in Histopot/ formalin pot		Specimen in Histopot/ formalin pot			5-10 days	Yes	Please ensure completed Tullamore Histopathology request form is with the sample. Ensure sample is fully labelled, screw cap fully closed and sample placed in sealed biohazard bag.	
HIV (Human Immunodeficiency Virus) 1, 2 PCR	NVRL	Blood	2.7ml	EDTA		Red	7 days	Yes	Send to lab ASAP for Processing	Separate and freeze plasma ASAP
HIV (Human Immunodeficiency Virus) 1, 2 Serology	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerate
HIV (Human Immunodeficiency Virus) Viral Load	NVRL	Blood	2.7ml	EDTA		Red	14 days	Yes	Send to lab ASAP for Processing	Separate and freeze plasma ASAP

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
HLA (Human Leucocyte Antigen) Antibody Investigation	IBTS	Blood	2 x 4.9ml	Serum		Brown	10 days	**Consultant Only**	Available Mon-Thurs as samples have to arrive in IBTS within 24 hours	1-2 serum required, Send within 24 hours. If not - Separate & store at 2-8° for no longer than 48 hours.
HLA (Human Leucocyte Antigen) - A,B C & DR Genotyping	IBTS	Blood	3x 2.7ml	EDTA		Red	21 days	**Consultant Only**	1-3 EDTA Whole Blood, Available Mon-Thurs as samples have to arrive in IBTS within 48 hours	
HLA B 27(Human Leucocyte Antigen) Genotyping	IBTS	Blood	3 x 2.7ml	EDTA		Red	21 days	**Consultant Only**	1-3 EDTA Whole Blood, Available Mon-Thurs as samples have to arrive in IBTS within 48 hours	
Homocysteine	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	14 days	**Hospital Only**	Fasting sample. Please contact laboratory before taking sample. **For inpatients only-** Take on ice, send to laboratory immediately on ice cubes. Available Mon-Fri	Separate <15 minutes and freeze
Homocysteine (Paeds)	Temple Street	Blood	2.7ml	Lithium Heparin		Orange	By Arrangement	**Hospital Only**	Fasting sample, Take on ice-cubes, Send to lab ASAP for Processing	Separate and freeze within 15 minutes. Require Temple St metabolic request form Include patients address and gender

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Homovanillic Acid (HVA)	Eurofins Biomnis	Urine		24 hour Urine Collection			10 days	**Hospital Only**	Urines have to be stored refrigerated during the collection process	State total volume. Acidify to pH 2-3 Freeze 2-3mls in T28 tube available in coldroom.
HPV (Human Papilloma Virus) DNA	Eurofins Biomnis	PAP Smear swab		Thin prep pap smear container			7 days	**Consultant Only**	Requires Eurofins Biomnis Request form – RQF928 available on website	Ambient
HTLV (Human T Lymphotrophic Virus) I and 2	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
Human T Lymphotrophic Virus (HTLV) I and 2	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
Human Herpes Virus 6 (HHV6) DNA (Altona)	NVRL	CSF		Universal	 or 		5 days	Yes		Refrigerated
Human Platelet Ag (HPA)	IBTS	Blood	3x 2.7ml	EDTA		Red	21 days	**Hospital Only**		Must arrive in IBTS within 48 hours
Huntington Disease	Crumlin	Blood	2X2.7ml	EDTA		Red	8-10 weeks	**Hospital Only**	Need clinical details and signed consent Form. Three identifiers required. Request for Genetic Analysis Form	
HVA (Homovanillic Acid)	Eurofins Biomnis	Urine		24 hour Urine Collection			10 days	**Hospital Only**	Urines have to be stored refrigerated during the collection process	State total volume. Acidify to pH 2-3 Freeze, 2-3mls in T28 tube available in coldroom.
Hyaluronic Acid	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Centrifuge and separate. Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Hydroxyprogesterone	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Take at the beginning of follicular phase	Refrigerated
IgA	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		
IgE	Mullingar Immunology	Blood	4.9ml	Serum		Brown	7-10 days	Yes		
IGF1 (Insulin Like Growth Factor/ Somatomedin C)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes if appropriate clinical details	Send to lab ASAP, must be processed <4 hours Specify Age and Clinical Details	Separated and frozen <4 hours
IgG	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Total protein and albumin done in Portlaoise Biochemistry first
IgG 4	St James	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Centrifuge, separate and refrigerate if delay in transport
IGHV (Immunoglobulin Heavy Chain)	St James	Blood	2 x 2.7ml	EDTA		Red	10-15 days	**Hospital Only**		Refrigerate, Slides and immunophenotyping history required
IgM	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Total protein and albumin done in Portlaoise biochemistry first
IL 2 (CD25)	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**		
IL 6 (Interleukine 6)	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Immunofixation	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		
Immunoglobulin Heavy Chain (IGHV)	St James	Blood	2 x 2.7ml	EDTA		Red	10-15 days	**Hospital Only**		Refrigerate, Slides and immunophenotyping history required
Immunoglobulins (IgG, IgA, IgM)	Mullingar Immunology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Total protein and albumin done in Portlaoise biochemistry first
Immunoglobulin Subclasses	St James	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerate. If delay with sending-centrifuge and separate
Immunophenotyping – Peripheral Blood (Flow Cytometry)	St James	Blood	2 x 2.7ml	EDTA		Red		**Hospital Only**	Ambient room temperature and received in SJH within 24 hours	Ambient room temperature and received in SJH within 24 hours
Imuran Level (Azathioprine)	Eurofins Biomnis	Blood	4 x 2.7ml	EDTA		Red	60 days	Yes	Requires clinical details - dates, times, dosage, age, height and weight - Mon-Thurs only	Whole blood, Has to arrive in Biomnis within 24 hours. Refrigerated
Infliximab	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	14 days	Yes	Requires Eurofins Biomnis Request Form R46-INTGB	Refrigerate or separated and frozen
Influenza Virus A or B or Screen	NVRL	Throat swab		Swab		Pink	3-5 days	**Hospital Only**	For inhouse testing please refer to Influenza in Microbiology Section (Bicoma Swab - 4 in 1 screen includes Covid, RSV and Infulenza A and B)	Refrigerated
Inhibin A	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	30 days	**Hospital Only**	Must be received in laboratory < 4 hours	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Inhibin B	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Non haemolysed - (Women-sample must be collected between 3rd and 4th day of menstrual cycle) Must be received in laboratory< 4 hours	Separated and frozen <4 hours
Innohep Levels (Anti Factor Xa)	National Centre for Hereditary Coagulation Disorders	Blood	3x3ml	Sodium Citrate		Green	3 days	**Hospital Only**	Send to lab ASAP for Processing Process as per Thrombophilia	Process as per Thrombophilia
Insulin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Non Haemolysed .Must be received in laboratory ASAP	Separated and frozen immediately
Insulin Like Growth Factor (Somatomedin C/IGF 1)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes if appropriate clinical details	Send to lab ASAP, must be processed <4 hours Specify Age and Clinical Details	Separated and frozen <4 hours
Insulin Like Growth Factor Binding Protein (IGFBP3)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Send to lab ASAP, must be processed <4 hours Specify Age and Clinical Details	Separated and frozen <4 hours
Intrinsic Factor Antibody (Pernicious Anaemia)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Islet Cell Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Serum not haemolysed	Refrigerated
JAK 2 Kinase Mutation	St James	Blood	3x2.7ml	EDTA		Red	10-15 days	**Hospital Only**		Refrigerated
John Cunningham Virus (JC PolymaVirus)	NVRL	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Karyotype-Product of Conception	Eurofins Biomnis	Soft Tissue/Foetal Placenta		CVS/POC Container			28 days	**Hospital Only**	Transport media available in maternity fridge and also in laboratory coldroom. Store @ 4˚C. Requires Eurofins Biomnis Genetic Test Request, Information & Consent Form	
Karyotype / Chromosome Studies / Cytogenetics (< 5yr)	Crumlin	Blood	2x2.7ml	Lithium Heparin		Orange	21 days	**Hospital Only**	Three patient identifiers required Need clinical details and signed Consent Form Children <5 years On-going Family Studies	Refrigerated
Karyotype / Chromosome Studies / Cytogenetics (>5 year)	Eurofins Biomnis	Blood	2x2.7ml	Lithium Heparin		Orange	28 days	**Hospital Only**	Available Mon-Wed only. Need clinical details and signed Eurofins Biomnis Genetic Test Request, Information & Consent Form	
Keppra (Levetiracetam)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Do not use tubes with phase separator. Received in laboratory <4 hours.	Separated and frozen <4 hours
Ketones	POC In Hospital	Blood					1 days	**Hospital Only**	POC	
Ketones	POC In Hospital	Urine	10mls	Universal Container		Yellow	1 days	**Hospital Only**	POC	
Kidney Stone/Renal Stone Analysis	Eurofins Biomnis	Kidney stone		Universal Container		Yellow	21 days	**Hospital Only**		Ambient

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Lacosamide (Vimpat)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with phase separator. Received in laboratory < 4 hours. Include clinical information / medication quantification	Separated and frozen <4 hours
Lactate	Portlaoise Biochemistry	Blood	2.7ml	Fluroide		Yellow	1 days	**Hospital Only**	Send to lab ASAP for Processing Sample must be spun within 15 minutes	Samples must be centrifuged within 15 minutes
Lamictal Level	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Do not use tubes with phase separator. Received in laboratory < 4 hours. Include clinical information / medication quantification	Separated and frozen <4 hours
Lamotrigine	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Do not use tubes with phase separator. Received in laboratory < 4 hours. Include clinical information / medication quantification	Separated and frozen <4 hours
Lanoxin (Digoxin/Digitoxin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	Refrigerate up to 48 hours if greater frozen -20°C up to 7 days
Lead Blood	Eurofins Biomnis	Blood	2x 2.7ml or 2x2.27 ml	Lithium Heparin or EDTA	 or 	Orange or Red	6 days	Yes	Whole blood. The skin must be washed with disinfectant before sampling.	Whole blood, refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Lead Urine	Eurofins Biomnis	Urine	20ml	Universal container or 24 hour Urine Collection	 or 	Yellow	15 days	**Hospital Only**	End of working shift urine	Aliquot into T28 tube
Legionella (Serology)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		Refrigerated
Leptin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown		**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Leptospirosis (Weils Disease)	NVRL	Blood	4.9ml	Serum		Brown	2 weeks	Yes		Refrigerated
Levetiracetam (Keppra)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Do not use tubes with phase separator. Received in laboratory < 4 hours. Include clinical information/medication quantification	Separated and frozen <4 hours
Lipase Blood	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 days	**Hospital Only**		Refrigerated
Lipase Urine	Eurofins Biomnis	Urine	10ml	Universal Container or 24 hour Urine Collection	 or 	Yellow or Brown	4 days	**Hospital Only**	Random urine sample or 24 hour sample also accepted	Aliquot into T28 tube – No preservative and State total volume
Lipoprotein (a)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Light Chain Assay - Kappa and Lambda Blood	St James	Blood	4.9ml	Serum		Brown	7 days	Yes	Haemolysed samples are unsuitable	Refrigerate. If delay with sending- centrifuge and separate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Lupus Anticoagulant	National Centre for Hereditary Coagulation Disorders	Blood	4x3ml and 4.9ml	Sodium Citrate and Serum	 and 	Green and Brown	2-3 weeks	**Hospital Only**	**ONLY RECEIVED IN LABORATORY BEFORE 13:00 FOR PROCESSING**. Send to lab ASAP. Require SHJ Thrombophilia / Lupus Request form	Process as per Thrombophilia Screen
Luteinizing Hormone (LH)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Lymphocyte Subsets	St James	Blood	2.7ml	EDTA		Red	By Arrangement- 2 days	**Hospital Only**	Available Monday – Thursday only	Ambient temperature. Send to SJH within 24 hours.
Lyme Disease (Borrelia Burgdorferi)	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Manganese	Eurofins Biomnis	Blood	4.9ml	Serum		White	15 days	**Hospital Only**		Refrigerated
Measles Virus (Serology)	NVRL	Blood	4.9ml	Serum		Brown	4-7 days	Yes	Immune status	Refrigerated
Measles Virus (Swab)	NVRL	Saliva		Oracol Swab		Blue	7 days	Yes	Measles virus RNA is routinely performed on oral fluid samples collected within 5 days of rash onset	Refrigerated
Meningitis PCR	Temple Street	Blood	2.7ml	EDTA		Red		**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11:00 Mon-Fri	
Meningitis PCR	Temple Street	CSF	0.5ml	Universal	 or 	Yellow / White CSF Container		**Hospital Only**	Requires TS request form IMSRL Include full address and gender To arrive in Temple St before 11:00 Mon-Fri	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
MEN1 (Multiple Endocrine Neoplasia)	Eurofins Biomnis		2 x 2.7ml	EDTA		Red	8 weeks	**Hospital Only**		
Mercury Blood	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	21 days	Yes		Whole Blood Refrigerated
Mercury Urine	Eurofins Biomnis	Urine	20mls	Universal Container		Yellow	21 days	Yes	Sample at end of day shift Spot Urine	Aliquot into T28 Tube
MERS-CoV	NVRL	PCR Swab		Red Bicomma Swab		Red		**By arrangement only**	NVRL and Public Health must be contacted prior to taking sample.	When handling sample MUST wear PPE and use Safety Cabinet. Label sample as Infectious and Hard Outer Container
Metabolic Screen – Paeds Blood	Temple Street	Blood	2.7ml	Lithium Heparin		Orange	7-14 days	**Hospital Only**	Send to lab ASAP for Processing Frozen plasma <1 hour Temple St Request form LF-META 0108 required	Separate and freeze <2 hours
Metabolic Screen – Paeds Urine	Temple Street	Urine	10ml	Universal Container		Yellow	7-14 days	**Hospital Only**	Send to lab ASAP for Processing Frozen <1 hour Temple St Request form LF-META 0108 required If Autism/ASD send to Eurofins Biomnis	Check pH and freeze immediately
Metanephrines Blood	Eurofins Biomnis	Blood	2x2.7ml	Lithium Heparin		Orange	7 days	**Hospital Only**	Must be received in laboratory and processed <1 hour. 2 samples required for this test , Ideally taken on fasting subject after 30 minutes rest period	Separated and frozen <1 hour

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Metanephrines Urine	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / yellow lid	7 days	**Hospital Only**	Refrigerate during collection period, Sent it lab <4 hours of end of collection. Do not perform sampling within menstrual cycle	24 hour Urine. In laboratory, Acidify to pH 2-3. Specify Total Volume, aliquot into T28 Tube, frozen <4 hours
Metapneumovirus	NVRL	Swab		Swab		Pink	5 days	**Hospital Only**		Refrigerated
Methadone Blood	Eurofins Biomnis	Blood	4.9ml	Serum		White		**Hospital Only**	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information / medication quantification	Separated and frozen <4 hours
Methaemoglobin	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	4 days	**Hospital Only**		Refrigerated
Methotrexate	Eurofins Biomnis	Blood	4.9ml	Serum		White	7-10 days	**Hospital Only**	Do not use tubes with Phase separator. Include clinical information / medication quantification	Refrigerated
Methylene Tetra Hydrofolate Reductase (MTHFR) Gene	Eurofins Biomnis	Blood	2x 2.7ml	EDTA		Red	10 days	**Hospital Only**	Refrigerate Clinical details and patient signed consent form required	Refrigerate
Methyl Malonic Acid (MMA) Blood	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	5 weeks	**Hospital Only**	Received in laboratory <1 hour R26-INTGB Metabolic biochemistry Request Form required, available to download from Eurofins Biomnis website	Separated and frozen <1 hour

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Microarray	Crumlin	Blood	2 x 2.7ml	EDTA		Red		**Hospital Only**	Clinical Details Signed consent form required. Three identifiers required	
Minimal Residual Disease	St James	Blood	3x2.7ml	EDTA		Red	10-15 days	**Haematology Consultant only**	Flow Cytometry Dept. Mon-Thurs only	Refrigerate. Must be received in SJH <24 hours
Mitochondrial Antibodies	Mullingar Immunology	Blood	1 x 4.9ml	Serum		Brown	3 days	Yes		
MMF (Mycophenolate Mofetil) /Cellcept / Mycophenolate	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	3 days	**Hospital Only**	Refer to Eurofins Biominis test guide for documents to download Specific Clinical Information Forms - R13-INTGB R31-INTGB	Refrigerated
Molecular Genetics (DNA Analysis)	Crumlin	Blood	2 x 2.7ml	EDTA		Red		**Hospital Only**	Clinical details and signed consent form required Three identifiers required.	
MPL (Myeloproliferative Leukaemia)	St James	Blood	3 x 2.7ml	EDTA		Red	10-15 days	**Haematology Consultant Only**		
MPL (Part of MPN Panel)	St James	Blood	2 X 2.7mls	EDTA		Red		**Hospital Only**		Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Monkeypox (Mpox)	NVRL	Skin swab, vesicle fluid, thro at swab		VTM(Viral Transport Medium)			3d	Yes	Phone lab prior to sending swab. VTM from mucosal or cutaneous lesion: either ulser or vescicular fluid if present. **Not to be opened or labelled in Specimen Reception – Label on Bag and Form with Lab Number.** 1. The Microbiology team should be notified of all suspected cases of Monkeypox 2. The swab should be taken from a cutaneous lesion either ulcer or vesicular fluid if present. If there are concerns that patient is presenting during the prodromal stage and there are no cutaneous lesions, a throat swab may be taken instead. A negative result for the throat swab does not rule out monkeypox and clinical correlation is advised and a follow up swab sample is required if lesions develop. Otherwise follow-up samples from confirmed cases are not recommended 3. Clearly label the anatomical site of sample collection on both the swab and the laboratory request form 4. Double bag the sample at the point of collection in the clinic setting. Place in separate hard outer container **Clearly** labelled for Monkeypox confirmation. Monkeypox requests are referred to the National Virus Reference Laboratory, Dublin. Tel: 01 716 4414/ 716 4415. NVRL will test VZV DNA and HSV 1 and HVS 2 DNA concurrently with Monkeypox requests	
MTHFR (Methylene Tetra Hydrofolate Reductase) Gene	Eurofins Biomnis	Blood	2x 2.7ml	EDTA		Red	10 days	**Hospital Only**	Clinical details and signed consent form required	Refrigerate
Multiple Endocrine Neoplasia (MEN1)	Eurofins Biomnis	Blood	2 X 2.7ml	EDTA		Red	8 weeks	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Mumps Blood	NVRL	Blood	4.9ml	Serum		Brown	5-7 days	Yes		Refrigerated
Mumps Oral Fluid	NVRL	Saliva		Oracol swab		Blue	5-7 days	Yes		Refrigerated
Mumps RNA	NVRL	CSF or Saliva		Universal or Oracol Swab	 or  or			Yes		Refrigerated
Muscular Dystrophy	Crumlin	Blood	2x 2.7ml	EDTA		Red	2-4 weeks	**Hospital Only**	Need clinical details and signed consent form Three identifiers required	
Mycoplasma Pneumoniea	NVRL	Blood	4.9ml	Serum or respiratory secretions		Brown	3-5 days	**Hospital Only**		Refrigerated
Mycoplasma Genitalium	NVRL	Urine or Swab		Aptima urine container or Aptima multitest swabs	 or 		5 days	Yes		Refrigerated
Mycoplasma Hominis	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	No antibiotics 72 hours prior to testing	Refrigerated
Myoglobin	Eurofins Biomnis	Blood	4.9ml or 2.7ml	Serum		Brown	4 days	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Myoglobin	Eurofins Biomnis	Urine	10mls	Universal Container or 24 hour Urine Container	 or 	Brown / Yellow	5 days	**Hospital Only**	Random urine sample or 24 hour sample also accepted	No preservative and State total volume. Frozen Aliquot in T28 tube with 4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Myosin Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 days	**Hospital Only**	Do not send haemolysed or lipemic samples	Refrigerated
Myosite Markers	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**		Refrigerated
Nail Clippings (Fungal Studies)	Mullingar			Universal Container		Yellow		Yes		
NAITP(Neonatal Alloimmune Thrombocytopenia Investigation	IBTS	Blood	3 x 4.9ml brown (Mother) 3x 2.7ml EDTA (Mother) 1 x EDTA (Neonate) 3 x EDTA (Father)	Serum and EDTA	 and 	Brown and Red		**Hospital Only**		
Natural Killer Cells (N K Cells)	St James	Blood	2 x 2.7ml	EDTA		Red	10 days	**Hospital Only**	Mon-Thurs only	Ambient temperature- to arrive in SJH within 24 hours
Nasopharyngeal Airway NPA Viral Panel Extended	NVRL	Swab		Pink/Red Swab	 or 	Pink / Red Swab		**Hospital Only**	State what test required	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Needle Stick Injury (Recipient or Source)	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes	Please ensure consent is given for source bloods	Inhouse: Source blood must be sent by taxi Urgently and please inform NVRL prior to sending - testing only performed between 08:00 and 22:00 at NVRL
Neurone Specific Enolase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Must be received in laboratory <1 hour. Not to be performed on haemolysed sample ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Separated and frozen <1 hour
Neurontin (Gabapentin)	Eurofins Biomnis	Blood	4.9ml	Serum		White	2 weeks	**Hospital Only**	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information/medication quantification. Always draw blood at the same time before another administration	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Newcastle Profile		Blood	See notes	Various		Various	10 days	**Hospital Only**	Contact Lab before taking samples. Kit Available from laboratory coldroom. (1 x PCA,1 X FLU OX, 4 White serum, 2 x EDTA, 1 X URINE, 1 X Guthrie card) Must be received back in lab immediately as Lactate/Ammonia have to be processed within 15 minutes. Laboratory Glucose result must be ≤ 2.6mmol/L	Contact Lab. Kit Available from laboratory coldroom. Refer to P/PATH/LI/003 – Sample requirements for Intermediary Metabolites (Newcastle Workup) For processing details. Send to: Paediatric Metabolic Section Dept. of Clinical Biochemistry Royal Victoria Infirmary Queen Victoria Road Newcastle Upon Tyne NE1 4LP 0044 (0)19 1282 4566
Niacin (Vitamin B3/PP)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	21 days	**Hospital Only**	Protect from light. Received in laboratory <4 hours	Whole blood frozen <4 hours. Protect from light
N K Cells (Natural Killer Cells)	St James	Blood	2 x 2.7ml	EDTA		Red	5 days	**Hospital Only**	Mon-Thurs only	Ambient temperature- to arrive in SJH within 24 hours
Noradrenalin (Free Catecholamines)	Eurofins Biomnis	Blood	2 X 2.7ml	Lithium Heparin		Orange	10 days	**Hospital Only**	Fasting sample. 30 minutes after rest period. Received in laboratory <1 hour	Separated and frozen <1 hour

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Nortriptyline (Amitriptyline)	Eurofins Biomnis	Blood	4.9ml	Serum		White	10 days	**Hospital Only**	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information/medication quantification. Always draw blood at the same time before another administration	Separated and frozen <4 hours
Oestradiol	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Oestrogen	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Olanzapine	Eurofins Biomnis	Serum	2-4ml	Lithium Heparin		Orange		Yes	Do not use tubes with Phase separator Include clinical information/medication quantification. Always draw blood at the same time before another administration	Refrigerated
Oligoclonal Bands	St James	Blood AND CSF	4.9ml and 300ul	Serum and Universal Container	 and  or 	Brown Yellow	10-20 days	**Hospital Only**	CSF and serum sample both required for analysis	Serum centrifuged and separated if delay in sending- Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Organic Acids	Temple Street	Urine	4mls	Universal Container		Yellow	7-14 days	**Hospital Only**	Received in laboratory ASAP. Must use Temple Street Metabolic request form LF-META-0108	Frozen ASAP Dipstick for pH. If >/= 8.5 request repeat. Record pH on metabolic request form. Must use Temple Street Metabolic request form LF-META-0108
Organic Acids (If Development Delays - Autism etc)	Eurofins Biomnis	Urine	4mls	Universal Container			1 month	**Hospital Only**	Received in laboratory <1 hour. Must include TS metabolic form LF-META-0108 or Eurofins Amino Acid/Organic Acid Form	Check Ph, Use T28 tube and Freeze sample within 1 hour or sampling
Orosomucoid Levels	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**	Must be received in laboratory <4 hours. Specify patients age and sex	Separated and frozen <4 hours
Osmolality Blood	St James	Blood	4.9ml	Serum		Brown	1 day	Yes		Refrigerated
Osmolality Blood Paeds	Crumlin	Blood	4.9ml	Lithium Heparin or Serum	 or 	Orange or Brown	1 day	Yes		Must be received in Crumlin <24 hours
Osmolality Urine	St James	Urine	10mls	Universal Container		Yellow	1 day	**Hospital Only**		Refrigerated
Osmolality Urine Paeds	Crumlin	Urine	10mls	Universal Container		Yellow	1 day	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Osmotic Fragility (Eosin 5 Maleimide Staining Erythrocytes/Hereditary Spherocytosis)	St James	Blood	2.7ml	EDTA		Red	By Arrangement	**Consultant Only**	Contact Haematologist Send to lab ASAP for Processing	Fresh EDTA anti-coagulated blood required (analysis must be within 24 hours of collection). FBC and blood film required. Please phone ahead to SJH when sending test.
Osteocalcin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Must be received in laboratory <4 hours ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Separated and frozen <4 hours
Oxalic Acid Blood	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**	Fasting sample, Must be received in laboratory immediately and processed <1 hour, requires R26-INTGB : Metabolic Biochemistry	Separated and frozen <1 hour
Oxalic Acid Urine	Eurofins Biomnis	Urine	50mls	24 hour Urine Container		Brown / Yellow top	4 days	**Hospital Only**		24 hour Urine. In laboratory, Acidify to pH 2-3. Specify Total Volume, aliquot into T28 Tube

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Oxcarbazepine	Eurofins Biomnis	Blood	4.9ml	Serum		White	10 days	Yes	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information/medication quantification. Residual level sample (just before administration)	Separated and frozen <4 hours
p ANCA	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Only performed if ANCA is positive	Refrigerated
Pancreatic Polypeptide	Eurofins Biomnis	Blood	2ml	Serum		White	1 month	**Hospital Only**	Do not use tubes with phase separator Received in lab <1 hour	Centrifuge quickly and immediately freeze serum
Parainfluenza Virus	NVRL	Nasopharyngeal aspirate or Swab		Universal Container or Swab	 or	Yellow Pink	5 days	**Hospital Only**		Refrigerated
Parathyroid Hormone (Parathormone)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes	Fasting sample, Must be received in laboratory <4 hours	Separated and frozen <4 hours
Parathyroid Hormone Related Protein (PTH-RP)	Eurofins Biomnis	Blood	2ml	EDTA-Aprotinin		Pink	14-21 days	**Hospital Only**	Must be received in laboratory <1 hour Special Sample tube Available from Lab coldroom	Frozen plasma < 1 hour Sample tube Available from Lab coldroom
Paroxysmal Nocturnal Haemoglobin (PNH) Screen	St James	Blood	2 x 2.7ml	EDTA		Red	7-10 days	**Hospital Only**	Must be tested within 48 hours - Mon - Thurs only. PNH clinical indication form required	
Parvovirus B19	NVRL	Blood	4.9ml	Serum		Brown	3-5 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
PAX 6 Gene	Crumlin	Blood	2 x 2.7ml and 2 x 2.7ml	Lithium Heparin and EDTA	 and 	Orange and Red	28 days	**Hospital Only**	Clinical details and Signed consent form required Three identifiers required	
PCR for E Coli	Temple Street PCR lab	CSF	500µl	Universal Container	 or 	Yellow/ white	5 days	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	
PCR for Group B Streptococci	Temple Street PCR lab	Blood or CSF	2.7ml or 0.5ml	EDTA or Universal Container	 or  or 	Red or Yellow/ White	1 day	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	
PCR for Haemophyllis Influenza	Temple Street PCR lab	Blood or CSF	2.7ml or 0.5ml	EDTA or Universal Container	 or  or 	Red or Yellow/ White	1 day	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
PCR Meningococcal DNA	Temple Street PCR lab	Blood or CSF	2.7ml or 0.5ml	EDTA or Universal Container	 or  or 	Red or Yellow/ White	1 day	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	
PCR Pneumococcal DNA	Temple Street PCR lab	Blood or CSF	2.7ml or 0.5ml	EDTA or Universal Container	 or  or 	Red or Yellow/ White	1 day	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	
PCR Septicaemia	Temple Street PCR lab	Blood or CSF	2.7ml or 0.5ml	EDTA or Universal Container	 or  or 	Red or Yellow/ White	1 day	**Hospital Only**	Sample must arrive in Temple St before 11:00 Mon - Fri Use TS request form Include full address and gender See TS request form for clinical indications	
Pernicious Anaemia Anitbodies (Intrinsic Factor Antibodies)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Pertussis (Whooping Cough) PCR	Crumlin	Swab		Pertussis Swab		Blue	5 days	Yes	Contact Microbiology Lab for special Swab	
Pertussis (Whooping Cough) Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Phenobarb/Phenobarbital	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Phenothiazines Blood	Eurofins Biomnis	Blood	4.9ml	Serum		White	10-14 days	Yes	Requests must include: R13- INTGB Request Form or clinical information/medication quantification required	Refrigerated
Phenylalanine Blood	Temple Street	Blood	2.7ml	Lithium Heparin		Orange	7 days	**Hospital Only**	Must be received in laboratory <2 hours. Mother and baby samples required Use TS 'Metabolic Investigations newborn screening follow up' request form Include patients full address and gender	Separate and Freeze plasma < 2 hours.
Phenytoin (Epanutin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Phosphatidylethanol (PEth)	Eurofins Biomnis	Blood	2 x 2.7ml	EDTA		Red	10 days	**Hospital Only**	Direct Alcohol Biomarker	Refrigerated
Phytosterols	Sheffield Children's Hospital	Blood	2.7ml	2 x Lithium Heparin		Orange	7 weeks	**Hospital Only**		Separate and Freeze @ -20°C
P1NP (Osteoporosis Screen / Bone Biomarker / Beta Crosslaps)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Plasma Viscosity	St James	Blood	2 x 2.7ml	EDTA		Red	1-2 days	**Hospital Only**		Samples can be sent to St James at room temperature for up to 4 days - if >4 days centrifuge @ 3000 for 10 minutes and separate
Plasminogen Activator Inhibitor-1	St James	Blood	2 x 3ml	Sodium Citrate		Green	3 weeks	**Hospital Only**	Contact N.C.H.D- THEY REFER THIS TEST OUT FOR INPATIENTS ONLY	Freeze ASAP
Platelet Immunophenotyping	St James	Blood	3ml	Sodium Citrate		Green	10 days	**Hospital Only**	Analyse <8 hours of collection and arrange with St James	
PNH (Paroxysmal Nocturnal Haemoglobin) Screen	St James	Blood	2 x 2.7ml	EDTA		Red	7-10 days	**Hospital Only**	Must be tested within 48 hours - Mon - Thurs only. PNH clinical indication form required	
Pneumococcal IgG/Specific Response to Pneumococcal Capsular Polysaccharide (Total IgG)	St James	Blood	4.9ml	Serum		Brown	21 days	**Hospital Only**		Serum centrifuged and separated if delay in sending- Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Pneumococcal Specific Vaccine Titre	Manchester Royal Infirmary	Blood	1.2ml	Serum	 or 	Brown or white	28 days	**Hospital Only**	1 serum for each test	Send to: PHE Vaccine Evaluation Unit, Manchester Medical Microbiology Partnership, Clinical Sciences Building (2nd floor, CSB2, PO Box 209) Manchester Royal Infirmary Oxford Rd Manchester M13 9WL 0044 (0)16 1276 8854/8788 (Results / enquiries)
Pneumococcus	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Pneumocystis (Carnii) Jirovecii	Eurofins Biomnis	BAL/Bronchial secretions	5ml	Universal container		Yellow	5 days	**Hospital Only**		Refrigerated
POLG Analysis	Crumlin	Blood	2 x 2.7ml	2 x EDTA		Red	28 days	**Consultant Only**	Must be requested by a consultant. Signed Genetic consent form and Consultant referral form are required. Three identifiers required. Crumlin forward these tests to Oxford.	
Polio Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	15 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Polyomavirus (JC)	NVRL	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated
Polyomavirus (JC)	NVRL	Urine	10mls	Universal Container		Yellow	10 days	**Hospital Only**		Refrigerated
Porphobilinogen (Delta Aminolevulinic Acid)	Eurofins Biomnis	Urine	100mls	Universal Container		Yellow	10 days	Yes	Early morning urine Keep away from light.	Keep away from light. Do not acidify. Refrigerate
Porphyrin	Eurofins Biomnis	Urine	20mls	Universal Container		Yellow	14 days	Yes	Must be received in laboratory <4 hours Early morning Urine. 3-day diet without red meat or chlorophyll	2 x aliquots frozen <4 hours into T28 Tubes
PR3 (Proteinase 3)	St James	Blood	4.9ml	Serum		Brown	10 days	Yes		Serum centrifuged and separated if delay in sending- Refrigerated
Prader Willi Syndrome	Crumlin	Blood	2 x 2.7ml and 2 x 2.7ml	EDTA and Lithium Heparin	 and 	Red and Orange	28 days	**Consultant Only**	Both samples for molecular and chromosome testing required Need clinical details and signed Crumlin consent form Three identifiers required	
Precipitins / Extrinsic Allergic Alveolitis / Farmers Lung	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
Primidone	Eurofins Biomnis	Blood	4.9ml	Serum		White	By Arrangement 2 weeks	**Hospital Only**	Do not use tubes with phase separators. Phenobarbital test must be performed in parallel. Frozen <4 hours R13-INTGB Request Form required/medication quantification	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Prograf - FK506 (Tacrolimus)	St Vincents or Transplant Centre Hospital	Blood	2.7ml	EDTA		Red	5 days	Yes	Whole blood Draw specimens before next Dose (Trough sample) MUST include clinical details Specify if Transplant patient.	Store at room temp Send to Transplant Centre, Hospital Lab
Pro Collagen 3 (Type 3 Procollagen)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Must be received in lab <4 hours	Separated and frozen <4 hours
Progesterone	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	5 days	Yes		
Proinsulin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Must be received in lab <4 hours	Separated and frozen <4 hours
Prolactin	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Prostate Specific Antigen (PSA)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		
Protein C	National Centre for Hereditary Coagulation Disorders	Blood	3 X 3ml	Sodium Citrate		Green	By Arrangement	**Hospital Only**	**Samples must be received in laboratory before 13:00**. Send to lab ASAP for Processing. Requires SJH Thrombophilia Screen / Lupus Anticoagulant Screen Request Form	Process as per Thrombophilia Screen. Send all paediatric samples to Crumlin. Process the same prior to dispatch
Protein C Paeds	Crumlin	Blood	3 X 3ml	Sodium Citrate		Green	By Arrangement	**Hospital Only**	Send to lab ASAP for Processing	Send to lab ASAP for Processing. Send all paediatric samples to Crumlin. Process as per Thrombophilia Screen.

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Protein S	National Centre for Hereditary Coagulation Disorders	Blood	3 X 3ml	Sodium Citrate		Green	By Arrangement	**Hospital Only**	**Samples must be received in laboratory before 13:00.** Send to lab ASAP for Processing. Requires SJH Thrombophilia Screen/ Lupus Anticoagulant Screen Request Form	Process as per Thrombophilia Screen. Send all paediatric samples to Crumlin. Process the same prior to dispatch
Protein S Paeds	Crumlin	Blood	3 X 3ml	Sodium Citrate		Green	By Arrangement	**Hospital Only**	Send to lab ASAP for processing	Send to lab ASAP for Processing. Send all paediatric samples to Crumlin. Process as per thrombophilia screen.
Proteinase 3 (PR3)	St James	Blood	4.9ml	Serum		Brown	10 days	Yes		Serum centrifuged and separated if delay in sending- Refrigerated
Prothrombin Gene Mutation (G20210A)	National Centre for Hereditary Coagulation Disorders	Blood	2x 2.7ml	EDTA		Red	8 weeks	**Hospital Only**	**Samples must be received in laboratory before 13:00.** Whole blood. Needs Thrombophilia Request Form (St James Haem Form 1429) Testing for APCR, Factor V Leiden and Prothrombin gene mutation analysis requires patient genetic consent.	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
PSA (Prostate Specific Antigen)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		
PTH-RP (Parathyroid Hormone Related Protein)	Eurofins Biomnis	Blood	2ml	EDTA-Aprotinin		Pink	21 days	**Hospital Only**	Must be received in laboratory < 1 hour Special Sample tube Available from Lab coldroom	Frozen plasma < 1 hour Sample tube Available from Lab coldroom
Pyridoxal Phosphate (Vitamin B6)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	9 days	**Hospital Only**	Whole Blood Frozen. Protect from light. Received in laboratory <4 hours	Whole blood frozen <4 hours. Protect from light
Pyruvate / Pyruvate Kinase / Erythrocyte Pyruvate Kinase	Eurofins Biomnis	Blood	5ml	ACD whole blood			2 weeks	**Hospital Only**	ACD tube available from lab coldroom ACD Whole blood. do not collect before the age of 1 year Dosage at a distance from any transfusion less than 3 months old	ACD whole blood, Refrigerated
Pyruvate	Newcastle	5% PCA PCA / Blood		PCA				**Hospital Only**	Instructions as per Newcastle profile- Ensure PCA is in date, Add 0.5ml blood to pre weighed PCA tube. Return sample and form to lab to be weighed and processed.	PCA- Available in Newcastle kit in coldroom. Process as per Newcastle profile
Q Fever (Coxiella Burnetti)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Quantiferon (Test for TB)	Mater Hospital	Blood	3ml	Kit available from lab with 4 tubes		Kit available from lab	7 days	**Hospital Only**	Available to Hospital patients only, with clinical details. - Not for health check screening. Sample tubes kept in laboratory- Please contact lab. Only available Mon-Thurs	Refer to External folder. Incubated 16-24 hours and centrifuged following day at 2000-3000g for 15 minutes. Store in refrigerator until dispatch. Can only be sent Mon-Thurs to Mater.
RAST	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	10 days	Yes		
Red Cell Membrane Screen	St James	Blood	2.7ml	EDTA		Red	10 days	**Hospital Only**	Contact SJH in advance, Whole Blood, Mon-Thurs	Blood film and FBC Report required, must be analysed in SJH within 24 hours. Contact SJH in advance
Reducing Substances	Eurofins Biomnis	Stool		Universal Container		Blue	14 days	Yes	min 20g	Frozen

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Renin	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**	Must be received in laboratory <4 hours. Must be written on BOTH sample and request form if upright or reclined. Specify upright or reclined (sampling in an upright position afer 1 hour or walking; sampling in the reclined position after 1 hour in a supine position)	Separated and frozen <4 hours
Renin / Aldosterone Ratio	Eurofins Biomnis	Blood	2.7ml	2 x EDTA		Red	5 days	**Hospital Only**	Must be received in laboratory <4 hours. Collect samples in morning after patients have been out of bed for at least 2 hours and have been seated for 5-15 minutes.	Separated and frozen <4 hours
Reptilase	National Centre for Hereditary Coagulation Disorders	Blood	2 x 3ml	Sodium Citrate		Green	1-4 days	**Hospital Only**	Send to lab ASAP	Processing as per factor assay Ensure patient is not on oral anticoagulants or Heparin
Respiratory Syncytial Virus (RSV)	NVRL	Respiratory / Throat swab		Viral Swab / Biocomma Transport Medium	 or 	Pink	3-5 days	**Hospital Only**		Refrigerated
Retinol (Vitamin A)	Eurofins Biomnis	Blood	4.9ml or 2.7ml	Lithium Heparin		Orange	9 days	**Hospital Only**	Must be received in laboratory <90 minutes. Protect from light.	Separated and Frozen <90 minutes Protect from Light

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Retinol Binding Protein Blood (RBP)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	4 days	**Hospital Only**		Refrigerated
Reverse T3	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	1 month	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen<4 hours
Rhinovirus	NVRL	Respiratory Throat Swab		Pink Swab / Red	 or 	Pink	5 days	**Hospital Only**		Refrigerated
Riboflavin (Vitamin B2)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	21 days	**Hospital Only**	Protected from light, received in laboratory <4 hours	Whole blood Frozen <4 hours Protect from light
Rickettsia	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		Refrigerated
Ritalin Levels (Methyl Phenidate)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14-21 days	Yes	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information / medication quantification	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Rivotril (Clonazepam)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with separator gel Must be received in laboratory and processed <4 hours. Include medication quantification and clinical details	Separated and frozen <4 hours
Rubella	NVRL	Blood	4.9ml	Serum		Brown	5-7 days	Yes		Refrigerated
Rufinamide	Eurofins Biomnis	Blood	4.9ml	Serum		White	15 days	**Hospital Only**	Do not use tubes with phase separator Requires R13-INTGB request form / medication quantification and clinical details. Must be received in laboratory <4 hours	Separated and frozen <4 hours
Sabril(Vigabatrin)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	**Hospital Only**	Do not use tubes with phase separator Requires R13-INTGB request form / medication quantification and clinical details. Must be received in laboratory <4 hours	Separated and frozen <4 hours
Salmonellosis - Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Refrigerated
SARS	NVRL	BAL, NPA, Sputum, Throat swab					By Arrangement	**Hospital Only**	Respiratory Specimen / BAL / NPA / Sputum / Throat swab processed on arrangement with NVRL	

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
SCID	Crumlin	Blood	1.6ml	EDTA		Red	1 day	**Hospital Only**	Transport by Taxi @ RT ASAP Must be analysed within 24 hours	
SCN1A Epilepsy/Dravets	Crumlin	Blood	1.6ml	EDTA		Red		**Hospital Only**	Crumlin Genetics Consent Form must be Signed	
Selenium	Eurofins Biomnis	Blood	4.9ml	Lithium Heparin		Orange	9 days	Yes	Do not use tube with phase separator	Refrigerated
Selenium	Eurofins Biomnis	Urine	20mls	Universal Container		Yellow	3 weeks	Yes	Random sample- indicate sampling time	Refrigerate- indicate sampling time

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Serotonin (5 Hydroxy Tryptamine)	Eurofins Biomnis	Blood	2X 2.7ml	Lithium Heparin		Orange	6 days	**Hospital Only**	Must be received in laboratory immediately and processed < 1hr. DIET: in the 48 hours preceding the sample, avoid foods or drinks rich in tryptophan (essential amino acid constituting serotonin): oily fish, poultry livers, brown rice, dairy products, bananas, chocolate / cocoa, dried fruits (nuts, almond, cashew nuts, dates), mango, avocado, tomato, plum, kiwi, pineapple, shellfish, beans and legumes, pumpkin seed Note that taking antidepressants such as IRRS (serotonin reuptake inhibitors) may decrease the basal level of serotonin. 2 specific aliquots for this analysis. Ideally accompanied by 5HIA urine test.	Whole Blood frozen <1 hour

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Serum Protein Electrophoresis (SPE/SPEP)	Mullingar Immunology	Blood	2 x 4.9ml	Serum *		Brown	3 days	Yes	*Please ensure 1 serum sample for Mullingar and 1 serum for Biochemistry MRHP to carry out Protein/Albumin	Total protein and albumin done in Portlaoise Biochemistry first
Sex Hormone Binding Globulin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-7 days	Yes	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample.	Refrigerated
Sickle Cell Screen (Paeds < 6 months)	Crumlin	Blood	2.7ml	EDTA		Red	5 days	**Hospital Only**		Include FBC Report and stained blood film plus serum sample

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Sirolimus	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	4-10 days	Yes	Residual level sample (just before administration)	Refrigerated
Sodium Valporate (Valporate/Epilim)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		Order on Biochemistry order tab
Somatostatin	Eurofins Biomnis	Blood	1ml	EDTA-Aprotinin		Pink	1 month	**Hospital Only**	Tubes available from laboratory coldroom on request Must be received in laboratory <1 hour	Centrifuge, separate freeze sample <1 hour
Somatomedin C (IGF-1/Insulin Like Growth Factor 1)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	Yes if appropriate clinical details	Send to lab ASAP, must be processed < 4 hours Specify Age and Clinical Details	Separated and frozen <4 hours
Specific IgE	Mullingar Immunology	Blood	4.9ml	Serum		Brown	7-10 days	Yes	Specific IgE testing is only carried out on patient samples when accompanied by a relevant clinical history	
Steroid Profile - Urine	Eurofins Biomnis	Urine	50ml	24 hour Urine Container		Brown	3 weeks	**Hospital Only**		50mls from 24 hour Frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Streptococcus Specific Vaccine Titre	Manchester Royal Infirmary	Blood	1.2ml	Serum	 or 	Brown or white	28 days	**Hospital Only**	1 serum for each test	Send to: PHE Vaccine Evaluation Unit, Manchester Medical Microbiology Partnership, Clinical Sciences Building (2nd floor, CSB2, PO Box 209) Manchester Royal Infirmary Oxford rd Manchester M13 9WL 0044 (0)16 1276 8854/8788 (Results / enquiries)
Strongyloidiasis	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Refrigerated
Synacthen	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	Short Synacthen Pre and 30min post Long Synacthen pre, 30 minutes and 60 minutes post - please state Pre or Post on Request Form	
Syphilis (VDRL/Treponema Pallidium)	NVRL	Blood	4.9ml	Serum		Brown	5 days	Yes		Refrigerated
T 3 (Triiodothyronine)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
T 4 (Thyroxine)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
T-ALL MRD	St James	Blood	3x2.7ml	EDTA		Red	10-15 days	**Hospital Only**	Flow Cytometry Dept. Mon-Thurs only	Refrigerate. Must be received in SJH <24 hours
T Cell Subsets (CD4, CD8)	St James	Blood	2.7ml	EDTA		Red	By arrang ement 2-4 days	**Hospital Only**	Whole blood at ambient temperature - to be processed within 24 hours by arrangement only - Samples received Mon-Thurs only, sample sufficient for Paeds. Send to lab ASAP for Processing	Ambient Temperature, Has to be received in SJH within 24 hours. Send FBC Report
T Cell / B Cell	St James	Blood	2 x 2.7ml	EDTA		Red	By Arrang ement 2-4 days	**Hospital Only**	Whole blood at ambient temperature - to be processed within 24 hours by arrangement only - Samples received Mon-Thurs only. 1 sample sufficient for Paeds. Send to lab ASAP for Processing	Ambient Temperature, Has to be received in SJH within 24 hours. Send FBC Report
Tacrolimus Levels (Prograf -FK506)	* St Vincents	Blood	2.7ml	EDTA		Red	3-5 days	Yes	Whole blood Draw specimens before next Dose (Trough sample) MUST include clinical details Specify if Transplant patient.	Store at room temp Send to Transplant Centre, Hospital Lab
Tapeworms (Echinococcus)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerate

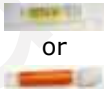
Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
TAU Protein (Amyloid) CSF	Eurofins Biomnis	CSF	3ml	Universal Container	 or 	Yellow	10 days	**Consultant Only**	Specific sampling kit provided on request from Biomnis Refer to sampling protocol for all practical information (available on Eurofins Biomnis online test guide Specific form-R34-INTGB	Specific sampling kit / CSF Frozen
TB (Quantiferon)	Mater Hospital	Blood	3ml	Kit available from lab with 4 tubes		Kit Available from lab	7 days	**Hospital Only**	Available to Hospital patients only, with clinical details. - Not for health check screening. Sample tubes kept in laboratory- Please contact lab. Only available Mon-Thurs	Refer to External folder. Incubated 16-24 hours and centrifuged following day at 2000-3000g for 15 minutes. Store in refrigerator until dispatch. Can only be sent Mon-Thurs to Mater.
TB (Tuberculosis) - Culture	St James	Sputum / BAL / CSF / Pleural fluid / tissue or Urine		Universal container	 or 	Yellow	8 weeks	**Hospital Only**	Urine by arrangements only, Requires completed IMRL request form	Ensure samples correctly packaged and labelled
Tegretol (Carbamazepine)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Testosterone (Female)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 days	Yes		Refrigerated
Testosterone (Male)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Tetanus-Immunity Test-IgG Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		Refrigerated
Tetanus Specific Vaccine Titres	Manchester Royal Infirmary	Blood	1.2ml	Serum	 or 	Brown or white	28 days	**Hospital Only**	1 serum for each test	Send to: PHE Vaccine Evaluation Unit, Manchester Medical Microbiology Partnership, Clinical Sciences Building (2nd floor, CSB2, PO Box 209) Manchester Royal Infirmary Oxford Road Manchester M13 9WL 0044 (0)16 1276 8854/8788 (Results/enquiries)
TFT (Thyroid Function Tests)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Thalassaemia Screen	St James	Blood	2.7ml and 4.9ml	EDTA and Serum	 and 	Red and Brown	10-14 days	**Hospital Only**	1 x EDTA and 1 x serum required.	Send a copy of FBC report plus stained slide and serum sample
Theophylline (Aminophylline / Uniphyllin)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Thiamine (Vitamin B1)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	6 days	**Hospital Only**	Protect from light, Must be received in lab immediately and processed <4 hrs	Whole blood Frozen <4hr Protect from light

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Thiopurine Methyl Transferase(TPMT)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	1 week	**Hospital Only**		Refrigerated Mon - Wed
Thrombophilia Screen includes Protein C, Protein S, Antithrombin III, Factor VIII, Fibrin, APCR, Lupas, Factor V Leidin, Anticardiolipin Ab)	National Centre for Hereditary Coagulation Disorders	Blood	6 x 3ml and 2.7ml and 4.9ml	Sodium Citrate and EDTA and Serum	 and  and 	Green and Red and Brown	8 weeks	**Hospital Only**	**MUST BE RECEIVED IN LABORATORY BEFORE 13:00.** Send to lab ASAP, Requires SJH Thrombophilia Screen/ Lupus Anticoagulant Screen Request Form and patient consent. Clinical Details mandatory	Paeds samples sent to Crumlin Check samples for clots. Spin Coag tubes for 10mins @ 4000rpm. Pool Plasma and respin for 10 minutes @4000rpm. Aliquot into Paeds. Serum tubes (3 for factor assay) (8 for thrombophilia). Freeze. Process on the sample day or freeze <6 hours Requires NCHCD Request form and ensure consent ticked. Clinical details are mandatory
Thyroglobulin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5-7 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Thyroglobulin Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	2 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerate
Thyroid Function Tests (TFT)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Thyroid Microsomal Antibodies	Mullingar Immunology	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		
Thyroid Peroxidase Antibody	Mullingar Immunology	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**		
Thyroid Stimulating Hormone	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3-5 days	Yes		
Thyroptropin Receptor Antibody (TRAB/Anti-TSH Receptor Antibodies	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerated
Thyroxine (T4)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
TNFa (Tissue Necrosis Factor Alpha)	Eurofins Biomnis	Blood	4.9m	Serum		Brown	3 weeks	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Tobramycin	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7-10 days	Yes	Residual level = before injection; Peak = 30 minutes after end of infusion or 1 hour after IM injection, Requires R18-INTGB Request Form required	Separated and frozen before sending
Tocopherol (Vitamin E)	Eurofins Biomnis	Blood	2.7ml	Serum	 or 	Brown or White	10 days	**Hospital Only**	Must be received in laboratory <90 minutes.	Separated and frozen <90 minutes
Topamax / Topiramate	Eurofins Biomnis	Blood	4.9ml	Serum		White	2 weeks	Yes	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information/medication quantification. Always draw blood at the same time before another administration	Separated and frozen <4 hours
TORCH screen	NVRL	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**	Includes: Toxoplasma/ Rubella/ Cytomegalovirus/ Herpes virus	Refrigerated
Toxicology Screen - Urine (Outpatients, Antenatals, GPs)	Drug Treatment Centre	Urine	10mls	Universal Container		Yellow	2 days	Yes		Send to: The Drug Treatment Centre Board, Trinity Court, 30-31 Pearse Street, Dublin 2.
Toxocara	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**		Refrigerate

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Toxoplasma	NVRL	Blood	4.9ml	Serum		Brown	7 days	**Hospital Only**		Refrigerated
TP53 Mutation	St James	Blood	3 x 2.7ml	EDTA		Red	6 weeks	**Hospital Only**		Refrigerated
TRAB (Thyroptropin Receptor Antibody /Anti-TSH Receptor Antibodies)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	5 days	**Hospital Only**	ATTENTION: interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to STOP treatment 8 days before taking the sample	Refrigerated
Treponema Pallidum (VDRL/Syphillis)	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
Trichomonas Vaginalis rRNA	NVRL	Urine or Swab		Aptima collection device	 or	Aptima container	7 days	Yes		Refrigerated
Triiodothyronine (T3)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	**Hospital Only**		
Trileptal (10 Hydroxy Carbazepine)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	**Hospital Only**	Do not use tubes with separator gel. Must be received in laboratory within < 4 hours. Clinical information and medication quantification required.	Separated and frozen <4 hours
Trypanosoma - Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	**Hospital Only**	Types Cruzi (Chagas disease) and Gambiense- clinical information required	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Tryptase	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3-4 days	**Hospital Only**	Draw blood as soon as possible after anaphylactic shock and then again at +2 hours and +8 hours	Refrigerate
Tuberculosis (TB) - Culture	St James	Sputum/ Urine		Universal container		Yellow	6 weeks	**Hospital Only**	Urine by arrangements only, Requires completed IMRL request form	Ensure samples correctly packaged and labelled
Tumour Necrosis Factor Alpha (TNFa)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3 weeks	**Hospital Only**	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Type 3 ProCollagen (Pro Collagen 3)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	14-21 days	**Hospital Only**	Must be received in lab <4 hours	Separated and frozen <4 hours
Typhoid - Serology	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	6 days	Yes		Refrigerate
Uniphyllin (Theophylline / Aminophylline)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	Medication Quantification or Request Form R13-INTGB required	
Urbanyl	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	**Hospital Only**	Do not use tubes with Phase separator Received in laboratory <4 hours. Include clinical information/medication quantification	Separated and frozen <4 hours
Ureaplasma Urealyticum	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7 days	Yes	No antibiotics 72 hours prior to testing	Refrigerated
Urinary Amino Acids	Eurofins Biomnis	Urine	10ml	Universal container		Yellow	14 days	**Hospital Only**	Fasting early morning urine , received in laboratory <1 hour Request Form R1-INTGB required	check pH and document on form, freeze sample <1 hr

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Urinary Amylase	Eurofins Biomnis	Urine	5ml	24 hour Urine Container or EMU		Brown / Yellow	4 days	**Hospital Only**	24 hour or early morning urine is also accepted	24 hour - State total volume. An early morning urine is also accepted - Aliquot into T28 Tube
Urinary Cortisol	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Brown / Yellow	5 days	**Hospital Only**		Non acified 24 hour Urine, aliquot into T28 Tube - State total volume
Urinary Haemosiderin	St James	Urine	10mls	Universal Container		Yellow	By Arrang ement	Yes	Only available Mon-Thurs	To arrive in St James within 24hours due to sample contamination
Urinary Magnesium	Eurofins Biomnis	Urine	10mls	24 hour Urine Container		Brown	7 days	Yes	Store in cool place during collection	State Total Volume , Acidify pH 1, aliquot into T28 tube
Urinary Mercury	Eurofins Biomnis	Urine	20mls	Universal Container		Yellow	15 days	Yes	Sample at end of work shift	Aliquot into T28 Tube
Urinary Myoglobin	Eurofins Biomnis	Urine	2mls	Universal Container or 24 hour Urine Collection or spot sample		Yellow	7 days	**Hospital Only**	Sample stored in refrigerator during collection process. Must be received in laboratory <4 hours after end of collection	Frozen 24 hour - State Total Volume, or random sample, Aliquot into T28 Tube and freeze <4 hrs
Urinary Osmolality	St James	Urine	10mls	Universal Container		Yellow	1 day	**Hospital Only**		Refrigerated
Urinary Osmolality Paeds	Crumlin	Urine	10mls	Universal Container		Yellow	1 day	**Hospital Only**		

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Urinary Retinol Binding Protein	Miscellaneous Laboratory	Urine	10mls	Universal Container		Yellow	21 days	**Hospital Only**	Send to: Sheffield NHS Teaching Hospitals NHS Foundation Trust, Dept. of Immunology, Laboratory Medicine Centre, Northern General Hospital, Herries Road, Sheffield, S5 7AU 0044 (0)11 4243 4343 (Switch)	
Urinary Steroid Profile	Eurofins Biomnis	Urine	50ml	24 hour Urine Container		Brown	3 weeks	Yes		50mls from 24 hour. Frozen
Urinary Stone / Kidney Stone Analysis	Eurofins Biomnis	Renal stone		Universal Container		Yellow	21 days	**Hospital Only**		Ambient
Urine Protein Electrophoresis	Mullingar Immunology	Urine	10mls	Universal Container		Yellow	3-5 days	Yes	Early morning urine OR Aliquot from 24 hour urine	(state total volume)
Vanillylmandelic Acid (VMA) Adults	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Yellow	8 days	Yes	Must be received in laboratory <4 hours after end of collection. Urine stored refrigerated during collection process	State total volume Acidify to pH 2-3 Freeze 2-3mls in T28 tube (available in coldroom) freeze <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Vanillylmandelic Acid (VMA) Children <14 years	Beaumont	Urine	10mls	Universal container		Yellow	12 days	Yes	Random sample. In the 48 hours prior to and during collection avoid consuming bananas, vanilla, tea, coffee, chocolate	Random sample Acidify to pH 2-3 In the 48 hours prior to and during collection avoid consuming bananas, vanilla, tea, coffee, chocolate. Contact Beaumont Lab 01 7977333 - re collection requirements
Varicella Zoster Virus (Chicken Pox) Serology	NVRL	Blood	4.9ml	Serum		Brown	3-7 days	Yes		Refrigerated
Varicella Zoster Virus (Chicken Pox) Swab	NVRL	Swab		Viral Swab		Pink	3-5 days	Yes		Refrigerated
VDRL (Syphillis / Treponema Pallidum)	NVRL	Blood	4.9ml	Serum		Brown	7 days	Yes		Refrigerated
VMA (Vanillylmandelic Acid) Adults	Eurofins Biomnis	Urine	20mls	24 hour Urine Container		Yellow	8 days	Yes	Must be received in laboratory <4 hrs after end of collection	State total volume Acidify to pH 2-3 Freeze 2-3mls in T28 tube (available in coldroom) freeze <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
VMA (Vanillylmandelic Acid) Children <14 years	Beaumont	Urine	10mls	Universal container		Yellow	12 days	Yes	Random sample. In the 48 hours prior to and during collection avoid consuming bananas, vanilla, tea, coffee, chocolate	Random sample Acidify to pH 2-3 In the 48 hours prior to and during collection avoid consuming bananas, vanilla, tea, coffee, chocolate. Contact Beaumont Lab 01 7977333 - re collection requirements
Valporate/Sodium Valporate (Epilim)	Mullingar Biochemistry	Blood	4.9ml	Serum		Brown	3 days	Yes		Order on Biochemistry order tab
Variegate Porphyrias	St James	Whole Blood	2 x 2.7ml	EDTA		Red	30-60 days	**Consultant Only**	Must contact St James Consultant Chemical Pathologist prior to sampling requires Request Form LF-BIO-0482	Refrigerated
Vasculitis Screen (ANCA)	St James	Blood	4.9ml	Serum		Brown	3-5 days	Yes	Same as Vasculitis Screen	Refrigerated
Vasoactive Intestinal Peptide (VIP)	Eurofins Biomnis	Blood	1ml	EDTA - Aprotinin		Pink	10 days	**Hospital Only**	Sample tubes available from lab coldroom. Must be received in laboratory immediately and processed <1 hour	Separated and frozen <1 hour
Vimpat (Lacosamide)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with phase separator. Received in laboratory <4 hours. Include clinical information/medication quantification	Separated and frozen <4 hours

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Vipit (Vaccine Induced Prothrombotic Immune Thrombocytopenia)	NCHD	2 x Serum	2x4.9mls	2 x Serum		Brown	2-3 days	**Hospital Only**	Requires Vaccine Induced Thrombotic Thrombocytopenia Form-HAEM Form-available from SJH website	Send refrigerated
Viscosity(Plasma)	St James	Blood	2x2.7ml	EDTA		Red	1-2 days	**Hospital Only**		Samples can be sent to St James at room temperature for up to 4 days - if >4 days centrifuge @ 3000 for 10 minutes and separate
Vitamin A (Retinol)	Eurofins Biomnis	Blood	4.9ml	Serum	 or 	Brown or White	7 days	**Hospital Only**	Must be received in laboratory <90 minutes	Separated and Frozen <90 minutes
Vitamin B1 (Thiamine)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	6 days	**Hospital Only**	Protect from light, Must be received in lab immediately and processed <4 hours	Whole blood Frozen <4 hour Protect from light
Vitamin B2 (Riboflavin)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	21 days	**Hospital Only**	Protected from light, received in laboratory < 4 hours	Whole blood Frozen <4 hours Protect from light
Vitamin B3/PP (Niacin)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	21 days	**Hospital Only**	Protect from light. Received in laboratory <4 hours	Whole blood frozen <4 hours. Protect from light
Vitamin B6 (Pyridoxal Phosphate)	Eurofins Biomnis	Blood	2.7ml	EDTA		Red	9 days	**Hospital Only**	Whole Blood Frozen. Protect from light. Received in laboratory <4 hours	Whole blood frozen <4 hours. Protect from light

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Vitamin B8/H (Biotin)	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	2-3 weeks	**Hospital Only**	Do not use tubes with phase separator. Must be protected from light.	Refrigerated
Vitamin B9 (Folic Acid)	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes		
Vitamin B12	Mullingar Endocrinology	Blood	4.9ml	Serum		Brown	3 days	Yes	If ordered without consultant - Form-M/CC/58 request form must be completed	Refrigerated
Vitamin C (Ascorbic Acid)	Eurofins Biomnis	Blood	2 x 2.7ml	Lithium Heparin		Orange	10 days	**Hospital Only**	Must be received in laboratory immediately and processed <20 minutes. Protect from Light. Only available Mon-Wed	Separate and freeze within 20 min, protect from light. Can only be sent Mon-Wed to Eurofins due to shelf life of frozen Li Hep-48 hours
Vitamin D (1,25 Dihydroxy Vitamin D)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes	Must be received in laboratory <4 hours	Separated and frozen <4 hours
Vitamin D3 (25 Hydroxy)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	3d	Yes		Refrigerated
Vitamin E (Tocopherol)	Eurofins Biomnis	Blood	2.7ml	Serum	 or 	Brown or White	10 days	**Hospital Only**	Must be received in laboratory <90 minutes.	Separated and frozen <90 minutes

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Vitamin K	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	**Hospital Only**	Must be received in laboratory immediately and processed <90 minutess. Protect from light Do not use tubes with phase separators	Separated and Frozen <90 minutes Protect from light
VITT Vaccine-Induced Prothrombotic Immune Thrombocytopenia	NCHD	2 x Serum	2 x 4.9mls	2 x Serum		Brown	2-3 days	**Hospital Only**	Requires Vaccine Induced Thrombotic Thrombocytopenia Form-HAEM Form-available from SJH website	Send refrigerated
Von Willibrand	National Centre for Hereditary Coagulation Disorders	Blood	4 x 3ml	Sodium Citrate		Green	10-20 days	**Hospital Only**	Send to lab ASAP	Processing as per factor assay. Paeds samples sent to Crumlin
Von Willibrand - Paeds	Crumlin	Blood	4 x 3ml	Sodium Citrate		Green	10-20 days	**Hospital Only**	Send to lab ASAP	Process as per Factor Assay Send to lab ASAP for Processing as per factor assay
Voriconazole	Eurofins Biomnis	Serum	3ml	Serum		White	12 days	Yes	Received in laboratory<4 hours Enclose the specific information form R8 INTGB anti-fungal agents and anti-tuberculosis drugs	Separated and frozen <4 hours
VZV DNA	NVRL	CSF		Universal Container	 or 		3-5 days	**Hospital Only**		Refrigerated
Weils Disease (Leptospirosis)	NVRL	Blood	4.9ml	Serum		Brown	2 weeks	Yes	Order Leptospirosis instead	Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Whooping Cough – Bordetella Pertussis (Serology)	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
Whooping Cough – Bordetella Pertussis (PCR)	Crumlin	Swab		Pertussis swabs		Blue	5 days	Yes	Contact Microbiology Lab for special Swab	
Xanthachromia on CSF	Beaumont	CSF and Blood	1ml and 4.9ml	CSF Container and Serum	 or  and 	CSF container and Brown	14 days	**Hospital Only**	By arrangement only. Refer to External folder for information and instructions regarding this protocol. Must be hand delivered to laboratory and processed within, 1 hour. Special container available from lab	See testing protocol. Refrigerated, protected from light
Yersinia	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	7-10 days	**Hospital Only**		Refrigerate
Zarontin (Ethosuximide)	Eurofins Biomnis	Blood	4.9ml	Serum		White	7 days	Yes	Must be received in laboratory <4 hours R13-INTGB Form required	Separated and frozen <4 hours
Zinc (Blood)	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	5 days	Yes	Received in laboratory immediately and processed <1 hour	Do not use tubes with phase separator Separate <1 hour Keep Refrigerated
Zinc (Urine)	Eurofins Biomnis	Urine	20mls	Universal Container		Yellow	15 days	Yes		Refrigerate
Zinc Protoporphyrin	Eurofins Biomnis	Blood	2.7ml	Lithium Heparin		Orange	10 days	**Hospital Only**	Protect from light. Only tested Mon-Wed due to sample stability	Protect from light, Refrigerate
Zika Virus IgG EIA	NVRL	Blood	4.9ml or 2.7ml	Serum		Brown	10 days	Yes		Refrigerated

Test name	Lab	Specimen	Volume	Container	Colour Bottle	Colour Code	TAT	Routinely available to Primary Care	Comment	Laboratory Comments
Zika Virus RNA	NVRL	Blood	4.9ml or 2.7ml	Serum		Brown	10 days	Yes		Separate and Frozen <24 hours
Zinc Transporter ZNT8	Eurofins Biomnis	Blood	4.9ml	Serum		Brown	10 days	Yes		Refrigerated
Zonisamide (Zonigram)	Eurofins Biomnis	Blood	4.9ml	Serum		White	14 days	Yes	Do not use tubes with phase separator Received in laboratory <4 hours Requires R13-INTGB Request Form/ medication quantification and clinical details	Separated and frozen <4 hours

16.0 TEST INDEX

Appendix 1 – (Members of the Working Group/PPPG Development Team)
Please list all members of the working group (and title) involved in the development of the document.

Name	**Title**	**Signature/Date***
Jennifer Cooper	Laboratory Quality Officer	
Shay Conroy	Laboratory Manager	
Frances Earley	Chief Medical Scientist Haematology/Blood Transfusion	
Eithne Lacey	Transfusion Surveillance Officer	
Aideen Joyce	Chief Medical Scientist Microbiology	
Sharon Ayres	Chief Medical Scientist Biochemistry	
Cathriona Ging	Senior Medical Scientist Point of Care	
Gordan Lalor	Senior Medical Scientist Surveillance	

Appendix 2 – (Members of the Service Management Group)
Please list all members of the Service Management group (and title) who have final approval of the document.

Name	**Title**	**Signature/Date***
Shay Conroy	Laboratory Manager	
Dr Kanthi Perera	Consultant Haematologist	
Dr Vivion Crowley	Consultant Chemical Pathologist	
Dr Pankaj Lal	Consultant Microbiologist	
Dr John Connaughton	Clinical Director	

* A signed copy is held in the Laboratory