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0 Amendment table
The UL Hospitals Laboratory User Manual(s) are controlled in accordance with local quality management system requirements. The changes to this revision are listed in the table below

<table>
<thead>
<tr>
<th>Section(s) updated</th>
<th>Reason for Revision</th>
</tr>
</thead>
</table>
| 2: Opening hours of the laboratory | - To add "The transport of samples to UHL outside of Ennis laboratory opening hours is co-ordinated by Ennis Hospital Nursing office. UHL laboratory request forms must be used"
  - To add "The scope of tests performed outside of Ennis laboratory opening hours when requests are sent to Limerick is available in the UHL Laboratory User manual MP-A-GEN-USERMAN - [http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html](http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html"
| 4: Contact numbers for the Pathology department | - Remove Haemovigilance office number
  - Replace Kevin O'Connell with Marie Carr
  - Replace Mary Deasy with Patricia Kennedy
  - Replace Mary O'Brien with Emer O'Donovan |
| 5: References ranges | - To add "Results above and below the reference range limits as stated on the report, are highlighted on the paper report using an asterisk symbol, and are highlighted in colour on the ILAB electronic report"
| 8: Minimum retesting interval | - To add "unless otherwise stated in the test repertoire section of this manual"
| 15: Specimen Referrals | - Faecal Immunochemical testing added and replaces Occult Blood in test repertoire. |
| 18: Test repertoire (Faecal Immunochemical testing) | - Cholesterol, HDL, and LDL cholesterol: “Fasting is not required for the analysis for a standard lipid profile”.
  - Add NCEP ATP III Guideline desirable levels for Lipids
  - Add Minimum retesting interval information
| 18: Test repertoire (Triglycerides) | - Triglycerides: “Fasting is not required for the initial analysis for a standard lipid profile” and “A 12-hour fast is essential if previous triglyceride >1.77mmol/L” |

1 Foreword
The purpose of this user manual is to provide information on the laboratory Service at Ennis Hospital.

The Laboratory at Ennis Hospital provides a limited Clinical Biochemistry and Haematology service to hospital ‘in patients’ and outpatient clinics and to General Practitioners in County Clare.

Please be advised that the UHL Laboratory User Manual provides a more comprehensive overview of policies, procedures and services across the UL Hospital Pathology Laboratories, as well as sample requirements, test repertoire and test turnaround times for all disciplines, and can be accessed as follows:

1. QPulse – Acutes Database - DIAG-LAB-LUR-16
2. iHUB
3. UL Hospitals Web Page via the following link:

[http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html](http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html)

2 Opening hours of the Laboratory
- The laboratory opening hours are

<table>
<thead>
<tr>
<th>Day</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Friday (Excluding Bank Holidays)</td>
<td>9.00 – 17:00hrs including lunchtime.</td>
</tr>
<tr>
<td></td>
<td>17:00 – 20:00hrs on call service.</td>
</tr>
</tbody>
</table>
- The blood gas analyser is available 24/7 for on-site users however if the analyser is out of service, or any individual test is not available then the pathology dept. can be contacted within the hours listed above. Outside of these hours the biochemistry dept. UHL Limerick is to be contacted.
- There will be one HSE van trip per routine working day taking samples to UHL Laboratories– at approximately 09:30 and one taxi trip at approximately 14:30 hrs.
- All Laboratory test requests ‘after-hours’ including weekends/Public Holidays which require urgent analysis are sent to UHL Laboratories via taxi.
- The transport of samples to UHL outside of Ennis laboratory opening hours is co-ordinated by Ennis Hospital Nursing office. UHL laboratory request forms must be used
- The scope of tests performed outside of Ennis laboratory opening hours when requests are sent to Limerick is available in the UHL Laboratory User manual MP-A-GEN-USERMAN - http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html.
- Samples for transfusion testing are taken in Ennis and sent to Limerick with the daily laboratory delivery at 09:30 hrs and 14:30hrs.
- As the majority of transfusions administered in Ennis are elective, the majority of samples should be sent during working hours. Urgent samples can be sent at any time.
- The transfusion laboratory in Limerick is contacted in advance to advise them of all out of hour’s samples for transfusion testing from Ennis.
- In the event of a requirement for emergency transfusion, three units of group O Rh D negative red cell concentrate are available in the issue fridge in Ennis.

3 Location of Laboratory
- There is a one-way traffic system in operation in the hospital. Enter the hospital campus via the main entrance and follow the road around the main hospital building. The Pathology laboratory is located at the rear of the hospital on the left hand side past the general stores.
- Access to Pathology Laboratories is restricted to hospital personnel on related laboratory business via swipe card.

4 Contact numbers for the Pathology Department

<table>
<thead>
<tr>
<th>Laboratory Office - Reports</th>
<th>065-6863230 / 3243</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Medical Scientist Office:</td>
<td>065-6863146</td>
</tr>
<tr>
<td>Biochemistry:</td>
<td>065-6863147</td>
</tr>
<tr>
<td>Haematology</td>
<td>065-6863142</td>
</tr>
<tr>
<td>Chief Medical Scientist.</td>
<td>Ms. Maeve O’Donnell 065-6863146</td>
</tr>
<tr>
<td>Laboratory Manager</td>
<td>Ms. Marie Carr 061 48 2244</td>
</tr>
<tr>
<td>Blood Sciences Project Lead</td>
<td>Ms. Mary Deasy</td>
</tr>
<tr>
<td>Pathology Quality Coordinator</td>
<td>Ms. Kathleen Keane 061 485075</td>
</tr>
<tr>
<td>Laboratory Information Systems Manager</td>
<td>Mr. Oliver Power 061 485098</td>
</tr>
<tr>
<td>Haemovigilance Officer:</td>
<td>Ms. Emer O’Donovan 0866011594 061-482657</td>
</tr>
</tbody>
</table>

5 Reference Ranges
The reference ranges, where appropriate are printed for easy reference beside the test results. Results above and below the reference range limits as stated on the report, are highlighted on the paper report using an asterisk symbol, and are highlighted in colour on the ILAB electronic report.
6 Reporting of Results
For users on-site at Ennis Hospital, St Joseph’s Hospital and Acute Psychiatric Unit, authorized results are available on the iLAB LIS system at terminals in all wards.

The Laboratory Porter returns all printed reports to the Department indicated on the patients form throughout the day.

GP/Nursing Home results etc. are electronically issued. A hardcopy report is not issued unless a specific request has been received for that surgery to receive hard copies. The reports are sent via the postal system to the requesting source.

Any critical results will be phoned through to the requesting clinician. Should any result warrant further investigation, scientific staff will contact the requesting Doctor to discuss the matter.

7 Turnaround Times
See individual test for turnaround times.
In exceptional circumstances where preceded by a phone call an FBC result will be available within 15 minutes of receipt in the laboratory and coagulation and biochemistry results will be available in 45 minutes.

8 Minimum repeat intervals
Minimum repeat intervals for this department are defined by clinical needs unless otherwise stated in test repertoire section of this manual.

9 Transport of Specimens to the Laboratory
Specimens are delivered to the Pathology Laboratory from the main hospital building by laboratory porter at regular intervals during the day or when specifically requested.

Samples from GPs, Nursing Homes and other outside sources can be delivered directly to Pathology Reception or by the Shannon Doc specimen collection / delivery system.

For specimens requiring immediate attention: for example, separation and freezing it is important that the sample is handed directly to a member of the laboratory staff. If unsure of the requirement for samples needing immediate attention information is in the UHL Pathology Laboratory User Manual available on-line at HSE Website and follow the links to UL Hospitals, Services, Pathology or the Pathology laboratory can be contacted at the numbers listed above.

Centrifuged biochemistry samples:
Biochemistry samples which have been centrifuged at the GP surgery should be stored upright at 4°C until transport to the laboratory the next day (Place the Serum Gel – brown top, in the specimen bag attached to the request form, wrap the form around the sample and place in a disposable cup in fridge). Please write “Spun” on request form. Please note that coagulation samples should not be refrigerated.

10 Sample transfer to Limerick
Tests performed in Ennis Hospital Pathology Department are listed in the test repertoire of this manual and on the Ennis Pathology request form.

Separate request forms and specimens are required for tests performed in UHL.

The Ennis Pathology laboratory acts as a dispatch point for the transfer of specimens to the relevant laboratory discipline in Limerick, at the following times; 09:30hrs and 14:30hrs.

Please note that samples are registered on the Laboratory Information System on arrival at the relevant laboratory in UHL.
11 Procedure for looking up Test results (on ILAB for ward enquiries)

1. Double click on icon or desktop NMM/APEX/Port Term
2. Enter Username
3. Enter Password
4. At selection Option Enter 1
5. Press Return x2
7. Having logged onto the Ward enquiry menu, select/type 1 or WRNQ.
8. The following screen is then displayed.

![Screen Image]

9. Enter Patient’s Hospital Number
10. Enter first 2 letters of patient’s surname.
11. **N.B. IF RESULTS CANNOT BE FOUND UNDER CHART NUMBER, DO A SEARCH UNDER THE DATE OF BIRTH.**
12. Enter U (for unknown) under the patient hospital number & press return.
13. Then enter surname of patient.
14. Return until cursor reaches forename.
15. Enter first name of patient and press return.
16. Enter Patient D.O.B.
17. Enter F or M (for Male or Female).
18. Press return until cursor is at bottom of screen.
19. When cursor is on A (for accept) at bottom of screen press return.
20. Choose patient by using arrow up or down & press return.

12 Storage of examined samples

If further examination of primary specimens is required, the specimens are stored as follows

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>STORAGE CONDITIONS</th>
<th>LENGTH OF STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESR</td>
<td>Room Temperature</td>
<td>7 Days</td>
</tr>
<tr>
<td>FBC</td>
<td>Refrigerated @ 4°C</td>
<td>7 Days</td>
</tr>
<tr>
<td>Coagulation</td>
<td>Room temperature</td>
<td>7 Days</td>
</tr>
<tr>
<td>Clinical Chemistry Specimens</td>
<td>Refrigerated @ 4°C</td>
<td>7 Days</td>
</tr>
<tr>
<td>Urine Specimens (pregnancy tests)</td>
<td>Refrigerated @ 4°C</td>
<td>7 Days</td>
</tr>
</tbody>
</table>
13 Additional examinations

Additional examinations may be requested by telephone but all telephone requests must be followed up with a request form. The laboratory will advise the requestor if the time limits for requesting additional examinations have been exceeded.

14 Blood Cultures

Blood cultures are analysed in University Hospital Limerick. Transport of blood cultures to University Hospital Limerick is arranged by the pathology laboratory from Mon to Sunday (including Public holidays) between the hours of 09:00 and 17:00hrs.

Outside of these hours urgent delivery of specimens to Limerick are to be arranged directly at ward level.

If the regular 09:30hrs and 14:30hrs transport deliveries are unsuitable a taxi will be ordered to ensure delivery of the blood culture to University Hospital Limerick within the required timeframe.

All blood cultures must be received in University Hospital Limerick Microbiology Dept and loaded on the Blood Culture analyser within 4 hours of specimen collection.

15 Specimen Referrals

Requests for Haemoglobin Electrophoresis (includes request Haemoglobinopathy screen/test, and Sickle testing), Haemochromatosis testing, and Faecal Immunochemical testing are referred from Ennis laboratory to external Laboratories. All other requests are forwarded to The Pathology Department, University Hospital Limerick for processing.

Details of specific test requirements are outlined in the test repertoire of the UHL Laboratory manual.

Referral laboratory details are displayed on the Laboratory Information System while the test is in progress. Hard copy referral reports are sent to the requesting clinician.

http://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/ulh/staff/resources/pppgs/labmanual.html

<table>
<thead>
<tr>
<th>Referred test</th>
<th>Referral laboratory</th>
<th>Specimen/test Requirements</th>
<th>TAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin Electrophoresis</td>
<td>Pathology Laboratory St James Hospital</td>
<td>1 EDTA specimen.</td>
<td>42</td>
</tr>
<tr>
<td>(Haemoglobinopathy screen/test, Sickle testing)</td>
<td>James St Dublin 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemochromatosis</td>
<td>Biomnis Ireland, Three Rock Road, Sandyford Business Estate, Dublin 18, Ireland.</td>
<td>2 EDTA samples, relevant clinical details (fasting transferrin &gt;45% and/or a close family history of confirmed haemochromatosis / confirmed mutation) and signed genetic testing consent form</td>
<td>21</td>
</tr>
</tbody>
</table>
Faecal Immunochemical Test (FIT)*

| MedLab Pathology, Unit 3, Sandyford Business Centre, Sandyford Business Park, Dublin 18. 01 2933690 1800 303 349 | Fresh stool sample in Green buffer tube. Samples accepted at Ennis lab on Monday, Tuesday and Wednesday only | 10 days |

* The FIT referred to MedLab Pathology has replaced Faecal Occult blood (FOB) test previously performed in Ennis Laboratory on a temporary basis.

### 16 Blood Transfusion

All Blood Transfusion testing is referred to University Hospital Limerick, Blood Transfusion Laboratory. From Monday to Friday specimens for Blood Transfusion testing are sent by lab van from the pathology laboratory at approx. 09:30hrs and at 14:30hrs by the routine taxi delivery to UL Hospital Limerick. Specimens are also sent by taxi to University Hospital Limerick on Saturday, Sunday and Public Holidays at approx. 10:00 hrs.

Transport of urgent blood transfusion requests to University Hospital Limerick is arranged by the Pathology laboratory from Mon to Sunday (including Public holidays) between the hours of 09:00 and 17:00hrs. Outside of these hours urgent delivery of specimens to Limerick is to be arranged directly at ward level.

During routine working hours deliveries of cross-matched blood and blood components may be delivered using either First Direct Medical Couriers or by taxi to Ennis Hospital Pathology Laboratory. Outside of normal working hours deliveries of cross-matched blood and blood components are delivered to reception at Ennis Hospital and the scientist on call is informed of the delivery and stores the blood in the Blood Transfusion Issue Fridge. Outside of laboratory working hours the nursing supervisor is informed and stores the blood in the Blood Transfusion Issue Fridge.

The Blood Track Manager system is used to track all movement of blood and blood components. Only those members of staff trained in the blood transfusion policies have access to store and remove cross-matched blood and blood components from the issue fridge.

Three units of emergency Issue Group O Rh D negative red cell concentrate (RCC) are stored in the Blood Transfusion Issue fridge.

### 17 Ordering of Laboratory Supplies

Requests for supplies from Ennis Hospital and General Practitioners in Clare are to be sent to the Laboratory at Ennis Hospital.

Supplies are to be ordered using the Ennis Laboratory supplies order form. The form can be sent to the Ennis Laboratory via, post, or email (ennislab.orders@hse.ie)

Forms are to be received by Tuesday, and the order will be ready for collection the following Friday. No subsequent request for orders will be processed until supplies have been collected.

Reference: LF-E-GEN-BTLRQSTFMORD (Blood Bottle / Request Form Order Sheet, Pathology Department, Ennis Hospital).

### 18 Test Repertoire:

#### Alanine Transaminase

**Specimen type:**
- Serum

**Special requirements or comments:**
- This assay is available as part of the liver test profile.
Please ensure that specimens for the assay of transaminase activity (ALT or AST) are delivered to the Laboratory within 24 hours of sample collection.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**Albumin**

**Specimen type:**
Serum

**Special requirements or comments:**
None. Assay is also available as part of the liver and bone profiles

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

**Minimum Retesting Interval:**
For more details, see RENAL / BONE section of:


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**Alkaline Phosphatase**

**Specimen type:**
Serum

**Special requirements or comments:**
Assay is also available as part of the liver and bone test profiles.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

**Minimum Retesting Interval:**
See LFT section of:


---

**Amylase**

**Specimen type:**
Serum

**Special requirements or comments:**
None.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**APTT (Activated Partial Thromboplastin Time)**

**Specimen type:**
Citrated plasma (blue top).

Special requirements:
APTT requests for heparin dosage assessment should be received by the laboratory within 1 hour of phlebotomy.
Samples for patients who are not on heparin must be received by the laboratory within 8 hours of phlebotomy.

Turnaround times:
Non GP 2hrs GP: 24hrs

Reference range:
See report

Aspartate Transaminase

Specimen type:
Serum

Special requirements or comments:
Please ensure that specimens for the assay of transaminase activity (ALT or AST) are delivered to the Laboratory within 24 hours of sample collection. Haemolysis invalidates the result.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Bilirubin

Specimen type:
Serum.

Special requirements or comments:
Protect sample from sunlight. This assay is also available as part of the liver test profile.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Minimum Retesting Interval:
See LFT section of:

Blood film

Specimen type:
EDTA.

Special requirements or comments:
Sample must be received within 2 hours of phlebotomy to avoid EDTA changes on the blood film. Please include relevant clinical details.
Blood films will be made, examined and reported on patients’ FBC results which satisfy the criteria laid in laboratory guidelines.

Turnaround time:
3 days (blood films which are referred to consultant haematologist for review may exceed this TAT)
Calcium

Specimen type:
Serum.

Special requirements or comments:
Prolonged venous compression during blood collection will increase serum calcium.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory (Please note age related reference ranges reported)

Minimum Retesting Interval:
See BONE / RENAL section of:

Important notes:
Albumin is the principal binding protein for calcium. A decrease in serum/plasma albumin will lead to a fall in albumin-bound calcium and a decrease in total calcium concentration and vice versa. Therefore serum albumin should always be requested with serum calcium. Total serum calcium can be ‘adjusted’ to ‘correct’ for changes in serum albumin. This adjustment of total calcium is to that expected to be present at an albumin concentration of 40 g/L. The adjustment equation used in this laboratory is as follows:

\[ \text{Adjusted calcium (mmol/L)} = \{(40 - \text{albumin}) \times 0.02\} + \text{measured calcium}. \]

Chloride

Specimen type:
Serum

Special requirements or comments:
This assay is also available as part of the electrolyte profile.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Minimum Retesting Interval:
For more details, see RENAL section of:

Cholesterol

Specimen type:
Serum

Special requirements or comments:
Prolonged venous compression during blood collection will increase serum cholesterol. Fasting is not required for the analysis for a standard lipid profile

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
NCEP ATP III Guideline desirable levels for Lipids:
Cholesterol (Total): <5.2 mmol/L
HDL-Cholesterol: Females >1.7 mmol/L Males >1.5 mmol/L
LDL-Cholesterol: <2.6 mmol/L

Minimum Retesting Interval (MRI): LOW risk cases for IHD assessment, MRI of 3 years
Higher risk cases for IHD assessment and those on stable treatment, MRI of 1 years

For more information, see LIPID section of:

Cholesterol: HDL fraction

Specimen type:
Serum

Special requirements or comments:
Fasting is not required for the analysis for a standard lipid profile

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
NCEP ATP III Guideline desirable levels for Lipids:
Cholesterol (Total): <5.2 mmol/L
HDL-Cholesterol: Females >1.7 mmol/L Males >1.5 mmol/L
LDL-Cholesterol: <2.6 mmol/L

Minimum Retesting Interval (MRI): LOW risk cases for IHD assessment, MRI of 3 years
Higher risk cases for IHD assessment and those on stable treatment, MRI of 1 years

For more information, see LIPID section of:

Cholesterol: LDL fraction

Specimen type:
Serum

Special requirements or comments:
Fasting is not required for the analysis for a standard lipid profile

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
NCEP ATP III Guideline desirable levels for Lipids:
Cholesterol (Total): <5.2 mmol/L
HDL-Cholesterol: Females >1.7 mmol/L Males >1.5 mmol/L
LDL-Cholesterol: <2.6 mmol/L

Minimum Retesting Interval (MRI): LOW risk cases for IHD assessment, MRI of 3 years
Higher risk cases for IHD assessment and those on stable treatment, MRI of 1 years

For more information, see LIPID section of:

Creatine Kinase

Specimen type:
Serum

Special requirements or comments:
After the onset of myocardial infarction, the diagnostic window is from the 12th to the 24th hour.
Note that values may be raised by exercise, intramuscular injections and bruising. Haemolysis interferes with the assay resulting in falsely raised values.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**Creatinine**

**Specimen type:**
Serum

**Special requirements or comments:**
In the case of blood specimens for creatinine assay, the serum should be separated from the red blood cells within five hours of venepuncture; otherwise substances are released from the red blood cells, which cause falsely raised serum creatinine concentrations. Both a serum specimen and a 24-hour urine collection are required for creatinine clearance.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**C-reactive Protein (CRP)**

**Specimen type:**
Serum

**Special requirements or comments:**
Appropriate clinical details are required.

**Turnaround time:**
Non GP 2 hrs GP: 24 hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**D-Dimers**

**Specimen type:**
Citrated plasma (blue top)

**Special requirements or comments:**

1) MAU/In–patient requests: D-Dimer requests that are not accompanied by the ‘Suspected DVT/PE’ request form, do not meet the appropriate Wells Score, or from a location not approved by the Haematology Team, will be rejected for testing.

2) External requests. All requests must include the relevant clinical details (QPE/QDVT /Wells Score) or be communicated directly to the Medical Scientist in Coagulation. D-Dimer testing should only be carried out in the community when assessing patients with low risk based upon a clinical score of a thrombosis (Well’s criteria for DVT assessment).

3) If the patients risk assessment indicates a high risk of thrombosis, the D dimer should not be requested and the patient should be referred into the Medical Assessment Unit for further investigation.

4) Requests should be received by the laboratory within 8 hours of phlebotomy

5) Lipaemic or haemolysed plasmas not suitable for analysis
eGFR (estimated glomerular filtration rate)

**Specimen type:**
Serum

**Note:** calculation is based on the 4v-MDRD Formula and is only applicable to adults (i.e. patients greater than 18 years old).

**Special requirements or comments:**
The serum should be separated from the red blood cells within six hours of venepuncture; otherwise substances are released from the red blood cells, which cause falsely raised serum creatinine concentrations.

**Turnaround time:**
Non GP 2 hrs GP: 24 hrs

**Reference range:**
Greater than 90 mL/min/1.73m²

**Important notes on Estimated GFR in adults using formulae**
1) Estimated GFR is calculated using the 4v-MDRD Formula (with creatinine assay calibration traceable to ID-MS).
2) Estimates of GFR are unreliable in acute renal failure due to the kinetics of creatinine accumulation.
3) GFR estimates between 60 and 89 mL/min/1.73m² do not indicate CKD unless there is other laboratory/clinical evidence of disease.
4) Estimated GFR should be multiplied by 1.212 for African-American patients.

**IDMS-traceable MDRD Study Equation for serum creatinine reported in SI units**

\[
eGFR \text{ (mL/min/1.73 m²)} = 175 \times \text{serum creatinine (µmol/L) x 0.011312)} - 1.154 \times \text{Age} - 0.203 \times (0.742 \text{ if female}) \times (1.212 \text{ if African American})
\]

The IDMS-traceable MDRD Study equation is for laboratories that use creatinine methods that have been calibrated to be traceable to IDMS.

For further information refer to KDOQI Guidelines on [www.kidney.org](http://www.kidney.org)

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**ESR**

**Specimen type:**
Sedivette/Sodium Citrate.

**Special requirements:**
Requests should be received by the laboratory within 6 hours of phlebotomy.

**Turnaround times:**
Non GP 2 hrs GP: 24 hrs

**Reference range:**
See report form

---

**Full Blood Count (FBC).**
Includes White Cell Differential – Neutrophil, Lymphocyte, Monocyte, Eosinophil and Basophil counts.

**Specimen type:**
EDTA (lilac top).
Special requirements or comments:
After 24 hours, WBC differential and red cell indices are affected by EDTA changes. Ensure samples are not taken from a drip site as this results in haemodilution of the sample.

Turnaround times:
Non GP 2H GP: 24H

Reference range:
See report form. WBC differential, haemoglobin and red cell indices are affected by pregnancy.

**Gamma Glutamyl Transferase (GGT)**
Specimen type: Serum

Special requirements or comments:
This assay is also available as part of the liver test profile.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Minimum Retesting Interval:
See LFT section of:

**Glucose**
Specimen type: Glucose specimen tube containing sodium fluoride EDTA as anticoagulant.

Special requirements or comments:
Record specimen collection time and state whether the specimen is fasting, post-prandial or part of a glucose tolerance test.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

**Glucose Tolerance Test (GTT)**
Specimen type: See special requirements and comments section.

Special requirements or comments:
Oral Glucose Tolerance Test (OGTT) using Rapilose® solution
An OGTT need only be considered to establish a diagnosis of diabetes if blood glucose values fall into an equivocal range (e.g. IFG or IGT) and is not necessary if the diagnostic criteria for diabetes are present.

OGTT is not necessary if the diagnostic criteria for Diabetes are present outside pregnancy. The OGTT is a diagnostic procedure; therefore, patients with a pre-existing Type 1 or 2 Diabetes do not require this test. OGTT in pregnancy should be done at weeks 24-28.

The patient should consume their normal diet for 3 consecutive days prior to test. The patient should be advised not to alter their diet prior to test. Perform OGTT after at least 3 days of unrestricted diet (> 150g CHO daily). The patient should fast (no food or fluids except water) overnight (8-12 hours).
Procedure:

1) Confirm patient has fasted for at least 8-12 hours
2) Collect first venous Blood sample (Fasting glucose) into Fluoride EDTA bottle (Smarted, grey cap) and label this bottle with PID, date and time.

3) Patient must drink the full content of the Rapilose OGTT solution pouch (300mL) over 5-10 minutes
4) The patient must sit quietly during the test and refrain from smoking.
5) 1 hour later take a second venous Blood sample collected into a Fluoride EDTA bottle (grey cap); label tube with PID, Date and Time
6) 2 hours post glucose drink collect third venous Blood sample (2 hr post prandial glucose) into a Fluoride EDTA (grey cap); label tube with PID, Date and Time
7) Refer to HSE 2010 Guidelines for the Management of Pre-gestational and Gestational Diabetes Mellitus from Pre-conception to the Post-natal period for the OGTT procedure and the diagnostic interpretation of OGTT in pregnancy.

Rapilose® NDC Stock item: 12MX1013

Notes on Oral Glucose Preparations for OGTT:

- For oral glucose tolerance testing, the standard dose for an adult is one pouch of Rapilose® OGTT Solution (300mL / 75g anhydrous glucose). However, it can be easily adjusted to paediatric applications based on body mass.
- The dose for children that weigh less than 43kg is 7mL (1.75g anhydrous glucose) per kg of body weight. The total children's dose should not exceed 75g.
- Each 300mL pouch of Rapilose® OGTT Solution contains exactly 75g anhydrous glucose, which is the adult dose recommended by the World Health Organisation.
- Rapilose® OGTT Solution is produced in a ready to drink format in a 300mL aluminium foil pouch with a tamper evident twist off cap.
- Rapilose® OGTT Solution is a pleasant tasting orange flavoured drink that is non-carbonated and contains no colour additives. It is also gluten, lactose, fat, caffeine and alcohol free.
- Rapilose® OGTT Solution has an 18 month shelf-life, when stored unopened at room temperature

Polycal® Liquid (neutral or orange):

- Polycal liquid may also be used as the 75 g glucose load for OGTT
- This 75g load is prepared by mixing 113mL of Polycal® with 250-300mL of water.

Criteria for diagnosis of Gestational Diabetes in pregnancy

A diagnosis of gestational diabetes is made when one or more values are met or exceeded on the 75 g OGTT in Pregnancy:

- Fasting Glucose > 5.1 mmol/L
- One hour glucose ≥ 10.0 mmol/L
- Two hour glucose ≥ 8.5 mmol/L

Post-natal Women with GDM should be offered advice on:

- Diet and lifestyle
- Risk of GDM in subsequent pregnancies
- Risk of Type 2 Diabetes in future
- The need for 6-12 weeks postpartum and annual OGTT

Blood glucose monitoring in the postnatal period:

- Once the placenta is delivered, maternal blood glucose and insulin levels may rapidly return to normal.
- Insulin therapy should be discontinued immediately postpartum.
- Capillary blood glucose monitoring should be discontinued once blood glucose returns to normal levels.
- Overt type 1 or diabetes should be suspected and investigated if hyperglycaemia persists.
- A 75g OGTT, using the WHO criteria for the non-pregnant population should be performed at 6-12 weeks postpartum and yearly thereafter as an increased risk of developing diabetes and cardiovascular disease exists.
- If normal these women should have lifelong screening for pre-diabetes or diabetes development every 3 years

**Note:** Following delivery, women diagnosed with GDM should be screened for persistent Diabetes 6-12 weeks postpartum, as an increased risk of developing type 2 Diabetes, type 1 Diabetes and cardiovascular disease exists. If normal these women should have lifelong screening for pre-diabetes or diabetes development every 3 years

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**

**Criteria for diagnosis of Diabetes, IFG and IGT in the non-pregnant adult:**

**Procedure:**

Similar as above but only need to collect venous blood in Fluoride EDTA bottles (grey cap):

1. Fasting sample taken prior to glucose drink
2. Sample taken 2 hours post glucose drink

Label tubes with PID, Date and Time and send to Biochemistry as soon as possible.

*IFG & IGT have an increased risk of future diabetes and cardiovascular morbidity*

- Advise on healthy eating, regular exercise and avoidance of obesity
- Check Fasting Blood Glucose annually
- Treat co-existing coronary risk factors aggressively, as are at increased risk of developing cardiovascular disease.

The pregnant women who meet the above criteria are considered to have overt type 2 diabetes mellitus

**hs Troponin T (high sensitivity Troponin T; hs-TnT)**

**Specimen type:**

Clotted blood in a brown-topped container (with gel) or lithium heparin plasma (green top). Plasma and serum samples should not be used interchangeably. Time of specimen must be noted on request form

**Special requirements or comments:**

In cases of suspected MI samples should be taken on admission (or onset of symptoms if in-patient) and 2 hours later. Further samples may be taken at 6 and 12 hours if interpretation unclear.
Troponin T (high sensitivity) interpretation
The biochemical marker offered by the Clinical Biochemistry Department to detect myocardial damage is Troponin T (TnT) high sensitivity
- it is specific for cardiac muscle damage
- It can be detected at 2 to 6 hours following onset of chest pain with peak concentrations at 12 to 16 hours, and remains elevated for 5 to 9 days
- In a clinically ischaemic patient with ECG changes consider AMI if: (a) TnT hs result changes by 20% in two specimens at least 2-3 hrs apart and, if (b) at least one result is >ULN
- The higher the % delta change, the more likely the diagnosis of MI.
- Biotin may cause some concentration dependent negative interference in this assay if very high dose supplements (>100 mg) are taken. If this is suspected, a repeat sample >8 hours post Biotin dose is recommended.
- Only for inpatients. If GP suspects coronary event then send patient to ED

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Limitations:
Haemolysed samples are unsuitable for analysis as haemolysis interferes negatively with the hs-TnT assay
The limit of detection of the assay is 5ng/L, the limit of quantification is 13ng/L

Infectious Mononucleosis screening test (Monospot)

Specimen type:
EDTA or serum

Special requirements:
N/A

Turnaround times:
Non GP 2hrs GP: 24hrs

Reference range: Negative or positive.

INR (international normalised ratio)

Specimen type:
Citrated plasma (blue top)

Special requirements or comments:
Only performed on patients receiving Warfarin therapy and as such this must be specified on the request form. PT / INR requests for Warfarin dosage assessment must be received by the laboratory within 24 hours of phlebotomy.
Details of anticoagulant therapy required. **Do not refrigerate INR samples**.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
See report

Lactate Dehydrogenase

Specimen type:
Serum
Special requirements or comments:
Note: haemolysis invalidates the assay.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Phosphate
Specimen type:
Serum.

Special requirements or comments:
Blood specimens for phosphate assay must be collected free of haemolysis. The serum should be separated within a period of two hours from venepuncture, since phosphate is released from red blood cells during the transport and storage of whole blood specimens thus causing a falsely raised serum phosphate concentration.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range (adult):
On biochemistry report or contact the laboratory

Minimum Retesting Interval:
For more details, see RENAL / BONE section of:

Potassium
Specimen Type:
Serum

Special requirements or comments:
Blood specimens for potassium must be collected free from haemolysis. The serum must be separated within a period of two hours from venepuncture, since potassium is released from red blood cells during transport and storage of whole blood specimens thus causing a falsely raised serum potassium concentration.

Primary Care Samples:
There is usually a delay in blood samples from Primary Care reaching the laboratory for processing. This delay can cause a falsely raised serum potassium concentration due to the release of intra cellular potassium from red cells, during transport and storage of whole blood.

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory

Minimum Retesting Interval:
For more details, see RENAL section of:

PT (Prothrombin Time)
Specimen type:
Citrated plasma (blue top).

**Special requirements:**
PT / INR requests for Warfarin dosage assessment must be received by the laboratory within 24 hours of phlebotomy. Details of anticoagulant therapy required. Do not refrigerate PT samples.

**Turnaround times:**
Non GP 2hrs GP: 24hrs

**Reference range:**
See report form

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**Pregnancy Test**

**Specimen Type**
Urine: Minimum volume: 1ml in sterile universal container

**Special requirements or comments:**
Do not use boric acid containers. Serum HCG levels are performed in the Biochemistry Department UHL.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
Positive or negative

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**Reticulocyte Count**

**Specimen type:**
EDTA (lilac top).

**Special requirements or comments:**
Requests should be received by the laboratory within 12 hours of phlebotomy.

**Turnaround times:**
Non GP 2hrs GP: 24hrs

**Reference range:**
See report form

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**Sodium**

**Specimen type:**
Serum

**Special requirements or comments:**
Serum electrolytes can only be measured on blood samples received in the Laboratory within 3 hours of phlebotomy. This is due to the sodium influx and potassium efflux from erythrocytes which occurs when blood is allowed to stand at room temperature for more than 4 hours. Please state the time of phlebotomy on the request form for U&E’s. Only requests which fulfil these criteria and are received in the laboratory within the specified time will have Sodium, Potassium measured.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

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**Minimum Retesting Interval:**
Inpatient monitoring of a stable patient: An inpatient with an admission sodium within the reference range should not have a repeat sodium within the average length of stay of 4 days.
Inpatient monitoring of a stable patient on IV fluids, adults as well as children: Daily monitoring of U&Es and glucose. For more details, see RENAL section of:


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**Total Protein**

**Specimen type:** Serum

**Special requirements or comments:** Prolonged venous compression during blood collection will increase serum protein.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

**Minimum Retesting Interval:**
For more details, see BONE / LFT section of:


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**Triglyceride**

**Specimen type:** Serum

**Special requirements or comments:** Fasting is not required for the initial analysis for a standard lipid profile. Serum triglyceride is subject to major increases following meals. A 12-hour fast is essential if previous triglyceride >1.77mmol/L.

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

**Minimum Retesting Interval (MRI):**
LOW risk cases for IHD assessment, MRI of 3 years
Higher risk cases for IHD assessment and those on stable treatment, MRI of 1 years
For more information, see LIPID section of:


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**Urea**

**Specimen type:** Serum

**Special requirements or comments:** This assay is also available as part of the U+E test profile

**Turnaround time:**
Non GP 2hrs GP: 24hrs

**Reference range:**
On biochemistry report or contact the laboratory

**Minimum Retesting Interval:**
For more details, see RENAL section of:

Uric Acid (Urate)

Specimen type:
Serum

Special requirements or comments:
None

Turnaround time:
Non GP 2hrs GP: 24hrs

Reference range:
On biochemistry report or contact the laboratory