The Biochemistry and Haematology Departments at Withybush General Hospital are busy departments receiving in excess of 300,000 requests for investigations in the year. This handbook is designed to give the information necessary to make best use of the services provided. The departments are currently accredited by CPA (UK) Ltd.

The departments of Biochemistry and Haematology are located on the ground floor of the hospital, just off the main corridor in the pathology department. Blood Transfusion is linked to the main laboratory by a short corridor situated just by the patients’ waiting area.

We are also happy to listen to any constructive suggestions about the layout of the handbook and the information presented. If there are any glaring omissions please let us know.
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APPENDIX ONE. 23

BIOCHEMISTRY/HAEMATOLOGY POLICY FOR PROCESSING OF ON-CALL SAMPLES 23
1 General Information

1.1 Laboratory Opening Times

The department is open from 0830 until 1800 Monday to Friday (excluding statutory holidays) for the receipt of routine and urgent specimens.

Outside of normal working hours the biochemistry and haematology departments provide an on-call service. The provision of this service is expensive and consequently MUST ONLY BE USED FOR EMERGENCIES where it is essential for the management of the patient that results are available before the commencement of normal working hours. Requests for emergency work MUST ONLY be made by the medical officer responsible for the care of the patient. See Appendix 1 for further details.

1.2 Clinical Advice

The Biochemistry and haematology departments provide a consultant led, or equivalent, scientific service, twenty-four hours a day. If you need help interpreting results or have any general queries do not hesitate to telephone the numbers listed below (Laboratory information and results) during normal working hours or via the hospital switchboard at other times.

1.3 Contact Details

1.3.1 Address

Biochemistry Department       Haematology Department
Withybush General Hospital      Withybush General Hospital
Fishguard Road         Fishguard Road
Haverfordwest          Haverfordwest
PEMBS                  PEMBS
SA61 2PZ                  SA61 2PZ

1.3.2 Telephone Numbers

Dialing in from outside:
Prefix extension numbers with 01437 77.... (STD Direct line) or using WHTN, dial 0 - 1720 - ....then 100 for switchboard or extension number for direct line.

General Enquiries and Results
Pathology Office          3238
Fax              3124

Clinical/Scientific Staff Extensions
Dr H. Grubb     Consultant Haematologist      3245
Dr S Kundu     Consultant Haematologist      2331
Dr M Bartlett        Associate Specialist in Haematology   3521
Consultant Clinical Biochemist    3234 (or via WGH Switchboard).

Specialist Nurses
Fiona Jenkins     Anticoagulation Nurse        2324
Anne Jackson       Transfusion Nurse Practitioner    2428

Laboratories
Biochemistry Main Laboratory       3238
Haematology Laboratory          3271
Blood Bank             3230

BLOOD SCIENCES HANDBOOK
Pathology Services Manager
Mrs. Andrea Stiens
01554 783065 (PPH) or 01267 248655
(WWGH)

Chief Biomedical Scientists
Biochemistry (Mrs. Anne Close) 3270
Haematology (Mr. Ted Allen) 3230

Pathology Quality Manager
Mrs. Hannah Albery 3270

Fax Machines
Pathology General Office 3124
Biochemistry Laboratory 3235
Haematology Laboratory 3480

1.4 Patient Sample and Request Form Identification Criteria
Please refer to MPPAT613 Patient Sample and Request Form Identification Criteria for further details (available on the Hywel Dda pathology intranet site – Withybush).

1.5 Specimen Collection and Handling
Please refer to LPBHB007 Procedure for Specimen Collection and Handling for further details (available on the Hywel Dda Pathology intranet site – Withybush).

1.6 Transportation of Diagnostic Specimens
Please refer to LPPAT002 Procedure for the transportation of diagnostic specimens to the pathology department for further details (available on the Hywel Dda Pathology intranet site – Withybush).

Samples from AE, ACDU and CDU may also be sent via the Air-Tube Transfer System (see MPPAT013 Air-Tube Transfer System and LIPAT012), copies of which are available at these locations.

1.7 Pathology Intranet Site
The pathology intranet site can be accessed from the Hywel Dda Health Board Home Page. Then from the main menu select:
- A-Z of Departments, Services and Groups or Committees
- ‘O P Q R S’
- Pathology Pembrokeshire
- Link to Pathology Department Withybush

2 BIOCHEMISTRY DEPARTMENT
The Biochemistry department provides a comprehensive repertoire of general chemistry and immunochemistry analyses to both the acute sector (24/7), primary care and community hospitals within the area. The department also provides services for other clients such as occupational health services, H M Coroner and private companies.

The department also provides a capillary blood collection service for adult diabetic clinics. It arranges and undertakes sweat tests and glucose tolerance tests. These tests must be arranged in advance and will only be performed if a request form or referral letter is signed by a doctor. The department is responsible (WAG regulations) for the supervision and quality assurance of instruments used outside the laboratory for point of care testing (POCT). Further details regarding POCT can be found on the POCT section of the Pathology intranet site – Withybush.)
2.1 Urgent Requests

Urgency of investigation Please use the following rules:-

ALL inpatient work received in the Department by 15:30 will be analysed and the results will be available on ward terminals by 17:00.
This will cover all routine work and some endocrine investigations. IF THIS IS ALL YOU REQUIRE, SEND THE SAMPLES AND DO NOTHING ELSE.

Requests for genuinely urgent work may be written on the request form if the work is sent between 8:30 and 18:00. Outside these hours please follow the on call policy of the department as stated in Appendix two.

Please do not write Phone / Fax on requests unless you have a particular valid reason, in which case state the time by which results are needed.

AS A RESULT WE WILL ONLY FAX GENUINELY URGENT REQUESTS AND IMPORTANT ABNORMAL RESULTS.

During Normal Working Hours

See above.

Outside Normal Working Hours

Please see appendix 1. This is the combined Biochemistry / Haematology On-Call Policy

The following analyses are available:

Blood  U&E, LFT, acid-base, oxygenation status, carboxyhaemoglobin, calcium, magnesium, osmolality, glucose, bilirubin, amylase, salicylate, paracetamol, iron, albumin, Troponin I (up until 11pm) and βHCG (up until 6pm).

Urine  sodium, potassium, creatinine, osmolality, pregnancy and protein / creatinine ratio.

CSF  protein, glucose and lactate.

Results from other requests made at the same time may also be returned but cannot be guaranteed out of hours. Exceptional out of hour’s requests (e.g. theophylline, ammonia) may require discussion with a Clinical Biochemist before acceptance.

Requests for urgent analyses out of normal working hours should only be made if the results are likely to affect patient management before the next full working day.

It should not be assumed that samples left at Pathology Reception out of hours will be analysed. The Biomedical Scientist on-call for Biochemistry (who may not be resident) must be contacted, by bleep in the first instance, if any such samples are urgent and required for immediate patient management.

2.2 Results

REMEMBER THAT VALIDATED RESULTS WILL BE AVAILABLE ON THE WARD TERMINALS

Every correctly received request will generate a written, authorised report sent to the source indicated on the request form. Copy reports will be sent to other authorised recipients identified on the request. Urgent or unexpectedly abnormal results will be telephoned or faxed. Interpretive comments (either standard or free text) will accompany some reports. Unless otherwise stated, all reports are final reports.

Results can be transmitted electronically to family practitioners via the DTS system. Access to the
Pathology computer system from clinical areas within the hospital is available.

If you require further information please contact Mrs Anne Close (Deputy Systems Manager/Telepath) on ext. 3293).

4.3 **Turnaround Times**

Target turnaround times from receipt of sample to reporting results are:

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Gas</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Requests marked 'urgent' or &quot;phone/fax result&quot; but without prior arrangement</td>
<td>may take up to 2 hours at busy times but we will endeavour to process them as quickly as possible</td>
</tr>
<tr>
<td>Non-urgent routine requests on in-patient samples (e.g. urea and electrolytes, LFTs etc.)</td>
<td>Same day</td>
</tr>
<tr>
<td>Non-urgent routine requests on GP or OPD samples (e.g. urea and electrolytes, LFTs etc.)</td>
<td>1-2 working days</td>
</tr>
<tr>
<td>Non-urgent specialised requests (e.g. endocrine, therapeutic drugs)</td>
<td>1 week</td>
</tr>
<tr>
<td>Non-urgent samples sent to other laboratories.</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>Urine Pregnancy Tests</td>
<td>1 hour</td>
</tr>
</tbody>
</table>

2.4 **Specimen Collection**

Blood samples are collected throughout Hywel Dda Health Board (Pembrokeshire Division) by the Sarstedt Monovette system which must be used according to the manufacturer’s recommendations. Any problems or questions regarding the use of the system should be addressed to the laboratory.

Samples inadequately labelled with identification may be discarded (please see MPPAT613 Patient Sample and Request Form Identification Criteria for further details).

Sarstedt heparinised syringes should be used for taking blood gas samples. Blood gas samples taken into normal syringes with added heparin are acceptable as long as the sample contains the appropriate amount of heparin, there is no air bubble and the needle is removed from the syringe prior to dispatch to the laboratory. ALL BLOOD GAS SAMPLES MUST BE SENT IN ICE.

Samples from multiple collections for dynamic function tests must be appropriately labelled e.g. "fasting", "pre-dose" or with the time of collection.

If you are unable to obtain an adequate sample, please indicate the test priorities.

For specimen requirements please refer to LlIBH013 Blood Test Bottle Colours and LlIBIO052 Urine Test Bottle Colours (available on the Hywel Dda Pathology intranet site – Withybush).

2.5 **Add-on Policy**

Samples are kept up to a maximum of 1 week after receipt in the laboratory; however, there are time limits for requesting some additional tests. For further information please refer to the Blood Test Bottle Colours Document which is available on the Withybush Pathology Intranet Site.

Add-on requests are not accepted for urines.
2.5.1 Secondary Care

If additional tests are required on a sample that has already been sent to the lab, then provided that the guidelines for time-limits of additional tests have been met, a request form should be sent to the lab. The request form should state any relevant clinical details and that there is a sample already in the laboratory. A phone call is NOT necessary unless the request is urgent.

2.5.2 Primary Care

Non-urgent add-on requests for additional biochemistry or haematology examinations should be made via the following e-mail address:

Hdd_Pembs.Haem_Biochem@wales.nhs.uk

The following information MUST be provided:
- Specimen number
- Patient Initials
- Tests required

2.6 Patient Preparation

Fasting samples are required for lipid profiles, fasting glucose and glucose tolerance tests. The laboratory should be contacted for information about patient preparation and sample requirements for specialised tests.

2.7 Investigation Guidelines

The Department has written various investigation guidelines which are available either on the Biochemistry section of the Pathology intranet site or by request from the Biochemistry department.

Suggestions for the improvement of these guidelines are always welcome.

2.8 Quality Assurance

The Department participates in national external quality assessment schemes to monitor the accuracy and precision of its analyses. Internal quality control is used to check the validity of results on a day to day basis. It is important that the laboratory be informed at once if results appear inconsistent with a patient's condition or are at variance with previous results.

2.9 Test Repertoire

Profiles

The following standard profiles may be requested but it is preferable to request individual tests where appropriate (e.g. potassium instead of U+E)

- Urea and electrolytes (U&E) sodium, potassium, urea, creatinine, eGFR
- Electrolytes and eGFR sodium, potassium, creatinine, eGFR
- Liver function tests (LFT) bilirubin (total), alkaline phosphatase (ALP), alanine aminotransferase (ALT), and albumin.
- Cardiac Marker Troponin I Troponin I requests to be sent on admission or >12 hours after the onset of chest pain. (STATE ESTIMATED TIME OF CHEST PAIN [24 HOUR CLOCK] ON REQUEST FORM)

It is important that we receive with the request a time of onset of symptoms. This will be reported with the result and will allow other Clinicians who treat the patient or view the result to know that it was collected before 12 hrs. This is important as a negative result earlier than 12 hr does not exclude ACS.
If a negative or borderline result is obtained then a second sample should be sent at or after 12 hr from the onset of symptoms. Again this should be accompanied with a statement of the time of onset of symptoms.

If the admission sample is positive then there is no need for a repeat at 12 hr. Exceptional requests should be made to the Consultant Biochemist.

**Bone profile**
albumin, corrected calcium, alkaline phosphatase, phosphate.

**Fasting lipid profile**
total cholesterol, triglycerides, HDL-cholesterol, LDL-cholesterol (calculated/measured), CHOL: HDL ratio (calculated). Guideline available.

**Thyroid function tests (TFT)**
TSH (normally front line test), free thyroxine (fT4), and free triiodothyronine (fT3). Combination reported is dependent upon the clinical information supplied. Guideline available.

**ITU profile**
(daily monitoring for patients in ITU or receiving TPN; for more frequent requesting ask for specific tests or profiles only) sodium, potassium, urea, creatinine, eGFR, bilirubin (total), alkaline phosphatase (ALP), alanine aminotransferase (ALT), corrected calcium, albumin, total protein, glucose.

**Bilirubin (split)**
unconjugated and conjugated bilirubin (sum of these approximates to total bilirubin).

**Myeloma screen**
blood: total protein, albumin, corrected calcium, alkaline phosphatase, IgG, IgA, IgM, electrophoresis, paraprotein typing and quantitation if present

urine: total protein, electrophoresis, paraprotein typing and quantitation if present

**Paraprotein monitoring**
(previously diagnosed patients) blood: total protein, albumin, IgG, IgA, IgM, electrophoresis paraprotein quantitation

urine: total protein, electrophoresis, paraprotein quantitation

**Arterial blood gases including oxygenation status**
pH, pCO2, pO2, base excess, bicarbonate, oxygen saturation (sO2), oxygen content (tO2), p50.

**Oximetry**
oxygenated, reduced, carboxy-, met-haemoglobins, oxygen saturation (sO2).

**Mixed venous blood gases**
pO2, sO2, tO2 sodium, potassium, urea, creatinine, eGFR, bilirubin (total), alkaline phosphatase (ALP), alanine aminotransferase (ALT), albumin, corrected calcium, total protein, glucose, gamma glutamyl transpeptidase (GGT), full blood count

2.10 **Reference, therapeutic and target ranges**
Please refer to CIBIO001 Reference, therapeutic and target ranges (available on the Hywel Dda Pathology intranet site – Pembrokeshire).
3 Haematology Department

The Haematology and Blood Transfusion department performs a wide range of diagnostic haematology and coagulation tests, supplies blood and blood components and provides a clinical haematology service to both the acute sector (24/7), to primary care and to community hospitals within the area. The department also provides support for INR point of care testing (POCT) and Hb testing.

There is an outpatient clinic held at Withybush every Monday and Thursday afternoon. Referral to this clinic must be made by completing the Anticoagulant Form which is available on the wards.

3.1 Repertoire

The laboratory is divided into three areas:

3.1.1 Routine Haematology

(Telephone Ext 3271)

This section deals with Full Blood Counts, malaria screens, and ESRs

Note: Blood for Malaria testing - Viral Haemorrhagic Fever risk

Although the likelihood of viral haemorrhagic fever in a patient returning from Africa (and very rarely South America) is very low, the consequences of handling blood from such a patient without the correct safety precautions could be enormous.

When requesting blood tests on a patient returning from an endemic area in Africa please perform a clinical risk assessment of VHF. If in any doubt you should contact the Consultant Microbiologist.

On any subsequent request form please include the following:-
- exact countries visited
- date patient left Africa
- nature of visit (e.g. holiday, voluntary worker etc)

3.1.2 Coagulation and Special Haematology

(Telephone Ext 3271).

As its title suggests, this section deals with all other Haematology requests

INR
APTT
Coagulation screen (PT and APTT)
D-Dimer
Thrombophilia screen (includes antithrombin111, proteins C and S, Factor V leiden, PTGR, lupus anticoagulant and anticardiolipin antibodies)
B12/Folate
Ferritin
Rheumatoid Arthritis Screen
Glandular Fever Screen

Requests for coagulation studies to control anticoagulant therapy should be either for INR (International Normalised Ratio) if the patient is on Warfarin or APTT if the patient is on intravenous Heparin. The therapeutic ranges for these tests are given on the report slips. The consultant haematologists are happy to provide clinical advice on over anticoagulated patients.

Requests for Coagulation screen are vetted by the BMS in the Haematology Laboratory, in line with local and National Guidelines prior to processing, please ensure accurate and full clinical details MUST be present on the request form to ensure that appropriate coagulation screens are processed.
Special Investigations

Certain investigations are undertaken only after consultation with a Consultant Haematologist. These include: Bone Marrow aspirations, Cell markers, Platelet Antibodies, and investigations of Haemolysis.

3.1.3 Blood Transfusion

(Telephone Ext 3230)

It is advised that you make yourself familiar with the HMSO publication, Handbook of Transfusion Medicine, a copy of which is available on each ward and specialist unit.

A Group and Save request will mean that the sample from the patient is ABO and Rh (D) typed, screened for the presence of clinically significant alloantibody and stored at 4°C for a MAXIMUM of 5 days after collection. During this period the sample can be used for compatibility testing at the request of the medical practitioner responsible for the patient.

A sample for crossmatching or compatibility testing will be used to prepare a relevant number of units of compatible blood. The blood provided will normally be of the same ABO and Rh (D) type as the patient, but blood of a different type may occasionally be provided in the interests of efficient stock management. It should be remembered that, whereas the requesting medical practitioner has prime responsibility to his/her patient, the Transfusion Department also has responsibility to the donor for ensuring that blood is not wasted.

Crossmatched blood is held for 48 hours from the time it is requested and if not used is returned to stock. Should a transfusion regimen take longer than 72 hours a further sample is required in order to identify those patients who may have been stimulated into producing blood group antibodies which may render further units incompatible.

Blood for surgical lists should be requested in good time (24 hours in advance) and during normal working hours.

A MAXIMUM BLOOD ORDER SCHEDULE, based upon analysis of blood usage trends, is displayed at each ward station and should serve as guidance for the most appropriate type of request.

Please inform the Transfusion section if the need for blood changes in order that wastage is kept to an absolute minimum.

Samples for Group and Save or for Compatibility testing MUST only be taken by a registered medical practitioner, who has clinical responsibility for the care of the patient. A minimum of 5ml of clotted blood is required in a 10ml plain (red and white label) Monovette tube and the container must be labelled by the same medical officer with the following:

Patient's name and forenames
Date of birth
First line of address
Hospital Number/NHS Number

Do not use addressograph labels on sample tubes for Crossmatching or Group and Save or on the request forms.

ONLY THE DETAILS ON THE SAMPLE TUBE WILL APPEAR ON ANY COMPATIBILITY LABELS AND REPORTS ISSUED.

The request form MUST be completed by the medical officer responsible for the patient and ALL details must be entered.

A previous record of the patient's blood group may be found in the case notes together with any Blood
Transfusion Hazard labels, which are designed to draw attention to those patients previously sensitised to red cell antigens with production of clinically significant antibodies. The presence of atypical antibodies may cause some delay in the provision of compatible blood.

Kleihauer Test
Kleihauer testing is used in Obstetric haematology and evaluates the presence of HbF bearing red cells as a minor population in adult blood samples. It is used to identify the presence of Foetal RBC in Maternal Rh negative bloods and as such supports the dosing and administration of prophylactic anti-D in the prevention of haemolytic disease of the newborn.

The test has no routine application other then ensuring dosage is adequate in support of traumatic events beyond 20 weeks gestation although under the direction of Consultant grade clinicians the use of the technique can be discussed with the department.

Kleihauer testing has no role in the diagnosis of Abruptio Placentae.

Maternal sample requirements:
3ml EDTA – Kleihauer
5ml clotted – Antibody screen

Emergency Blood
Emergency blood will only be supplied at the request of MEDICAL STAFF who will accept all responsibility. Emergency blood is defined as that which requires to be used before the completion of compatibility tests.

During normal working hours a fresh blood sample (FULLY LABELLED) and a completed request form should be rushed to the Transfusion Department. Blood will be provided, matched for ABO and Rh (D) type and EMERGENCY LABELS attached. Compatibility labels will be issued at the completion of testing. If a valid sample is already held in the section then ABO and Rh matched blood will be immediately released with EMERGENCY LABELS. If a valid sample is not available or cannot be provided, reserve GROUP O NEGATIVE blood will be issued.

A fully labelled sample and request form must be provided for retrospective testing at the earliest opportunity.

Outside of normal working hours four units of Group O Negative blood are reserved for emergency use only. The REGISTER must be fully completed for each unit removed and a crossmatch request and sample provided for retrospective testing and provision of further units. The ON-CALL BIOMEDICAL SCIENTIST MUST BE INFORMED IMMEDIATELY IF THIS BLOOD IS REMOVED FROM THE BLOOD BANK.

3.2 Samples Required

3.2.1 Transfusion Specimens:
At least 5ml in a 10ml (red and white labelled) Monovette tube.

3.2.2 Haematology/Coagulation
For all other specimens required see LIBHB013 - blood test bottle colours. (available on the Hywel Dda Pathology Intranet Site – Withybush).
3.3 Adult Normal Ranges

3.3.1 Routine Haematology

(Dacie and Lewis 11th Ed 2006)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>g/dl</td>
<td>13 – 17</td>
<td>12 – 15</td>
</tr>
<tr>
<td>RBC</td>
<td>x 10^12/L</td>
<td>4.5 – 5.5</td>
<td>3.8 – 4.8</td>
</tr>
<tr>
<td>WBC</td>
<td>x 10^9/L</td>
<td>4.0 – 10.0</td>
<td>4.0 – 10.0</td>
</tr>
<tr>
<td>Platelets</td>
<td>x 10^9/L</td>
<td>150 – 400</td>
<td>150 – 400</td>
</tr>
<tr>
<td>MCV</td>
<td>fl</td>
<td>83 – 100</td>
<td>83 – 100</td>
</tr>
<tr>
<td>MCH</td>
<td>pg</td>
<td>27 – 32</td>
<td>27 – 32</td>
</tr>
<tr>
<td>MCHC</td>
<td>g/L</td>
<td>31.5 – 34.5</td>
<td>31.5 – 34.5</td>
</tr>
<tr>
<td>RDW</td>
<td>%</td>
<td>11.6 – 14</td>
<td>11.6 – 14</td>
</tr>
<tr>
<td>Reticulocytes</td>
<td>Absolute(x 10^9/L)</td>
<td>50 – 100</td>
<td>50 – 100</td>
</tr>
<tr>
<td>Reticulocytes</td>
<td>%</td>
<td>0.5 – 2.5</td>
<td>0.5 – 2.5</td>
</tr>
<tr>
<td>Hct</td>
<td></td>
<td>0.4 – 0.5</td>
<td>0.36 – 0.46</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>Absolute(x 10^9/L)</td>
<td>2.0 – 7.0</td>
<td>2.0 – 7.0</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>%</td>
<td>40 – 80</td>
<td>40 – 80</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>Absolute(x 10^9/L)</td>
<td>1.0 – 3.0</td>
<td>1.0 – 3.0</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>%</td>
<td>20 – 40</td>
<td>20 – 40</td>
</tr>
<tr>
<td>Monocytes</td>
<td>Absolute(x 10^9/L)</td>
<td>0.2 – 1.0</td>
<td>0.2 – 1.0</td>
</tr>
<tr>
<td>Monocytes</td>
<td>%</td>
<td>2 – 10</td>
<td>2 – 10</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>Absolute(x 10^9/L)</td>
<td>0.02 – 0.5</td>
<td>0.02 – 0.5</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>%</td>
<td>1 – 6</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Basophils</td>
<td>Absolute(x 10^9/L)</td>
<td>0.02 – 0.1</td>
<td>0.02 – 0.1</td>
</tr>
<tr>
<td>Basophils</td>
<td>%</td>
<td>&lt;1 – 2</td>
<td>&lt;1 – 2</td>
</tr>
</tbody>
</table>

Blood Volume

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cell Volume</td>
<td>25 – 35 ml/kg</td>
<td>20 – 30 ml/kg</td>
</tr>
<tr>
<td>Plasma Volume</td>
<td>40 – 50 ml/kg</td>
<td>40 – 50 ml/kg</td>
</tr>
<tr>
<td>Blood Volume</td>
<td>60 – 80 ml/kg</td>
<td>60 – 80 ml/kg</td>
</tr>
</tbody>
</table>

Plasma Viscosity

<table>
<thead>
<tr>
<th>Range</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

ESR

< 10 mm/hr

< 12 mm/hr

3.3.2 Special Haematology

<table>
<thead>
<tr>
<th>Test</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prothrombin Time</td>
<td>9.5 – 11.2 secs</td>
</tr>
<tr>
<td>APTT</td>
<td>23.5 – 31.0 secs</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>2 – 4 g/l</td>
</tr>
<tr>
<td>D-Dimer</td>
<td>&lt;0.55 mg/l</td>
</tr>
<tr>
<td>Anti Thrombin III</td>
<td>80 – 120 %</td>
</tr>
<tr>
<td>Protein C</td>
<td>73 – 121%</td>
</tr>
<tr>
<td>Protein S Total</td>
<td>55 – 125%</td>
</tr>
<tr>
<td>Protein S Free</td>
<td>65 – 155%</td>
</tr>
<tr>
<td>Factor VIII</td>
<td>50 – 150 u/dl</td>
</tr>
<tr>
<td>Factor IX</td>
<td>50 – 150 u/dl</td>
</tr>
<tr>
<td>Anti Xa Ranges</td>
<td>Clinical Advice available from Consultant Haematologist</td>
</tr>
<tr>
<td>APTT for unfractionated Heparin</td>
<td>1.5 – 2.5</td>
</tr>
<tr>
<td>DRVVT for Lupus Anticoagulant</td>
<td>&lt; 1.20</td>
</tr>
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</table>
**Biochemistry/Haematology Department**

**Withybush General Hospital**

**Author**: Hannah Albery

**Authorised by**: H Albery

**Filename**: LIBHB016

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**Edition No. 024**

**Date of issue**: 17/09/12

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### BLOOD SCIENCES HANDBOOK

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>Beta 2 GP1</td>
<td>0 – 5 u/ml</td>
</tr>
<tr>
<td>Anti Cardiolipin Abs Ig G</td>
<td>&lt; 10 gplu/ml</td>
</tr>
<tr>
<td>Anti Cardiolipin Abs Ig M</td>
<td>&lt;7 gplu/ml</td>
</tr>
<tr>
<td>Factor V Lieden</td>
<td>Homozygous Normal</td>
</tr>
<tr>
<td>20210 Prothrombin Mutation</td>
<td>Homozygous Normal</td>
</tr>
<tr>
<td>Serum Vit B12</td>
<td>160 – 1000 pg/ml</td>
</tr>
<tr>
<td>Serum Folate</td>
<td>2.5 – 6.5 ng/ml</td>
</tr>
<tr>
<td>Serum Ferritin (Male)</td>
<td>&gt; 20 ng/ml</td>
</tr>
<tr>
<td>Serum Ferritin (Female)</td>
<td>&gt; 10 ng/ml</td>
</tr>
<tr>
<td>RA Screen</td>
<td>&lt;15</td>
</tr>
<tr>
<td>IM Screen</td>
<td>Negative</td>
</tr>
</tbody>
</table>

The following screening tests should be Negative: -

- ANCA, MPO, and PR3, M2 ELISA, IF antibodies, Anti Parietal Cell Abs, ANF, Cytoskeletal Abs, Glomeluar Basement Abs, DNA Abs, Sickle Cell.

### 3.4 Haematology Turnaround Times

Urgent requests for FBC are available 45 minutes after receipt of the samples within the laboratory, and Coagulation screens and d-dimer requests within 1 hour.

Non Urgent requests from Inpatient and GPs and OPD, for FBC, ESR, INR, Coag Screen, and D-Dimer are available by the end of the working day.

Results of IM and RA screens are available usually within 72 hrs of being requested.

Results of Thrombophilia screens can take up to 6 weeks to be returned to us from UHW Cardiff. Most other send away test results will be available in 2-3 weeks.

Results of Cold Agglutinins are usually available within 5 working days.

Unless otherwise stated all reports for haematology and blood transfusion are final reports.

### 3.5 Blood Transfusion Turnaround Times

Routine crossmatching units are made ready as per request form, 24 hours notice is usually required for these requests.

Urgent crossmatch requests units are ready within 50 minutes of the request reaching the laboratory.

Group and Save request results are available within 24hrs of the request, urgent blood group requests are available within 1 hour.

Antenatal screens are available within 48 hours,

Kilehauer results are available within 48 hours, quicker if urgently requested.

HLA B27 approximately 21 days.

Platelet antibodies within 72 hours.

Full HLA typing within 4 days.

Compatibility testing – 5 days

### 3.6 Add-on Policy

Samples are kept up to a maximum of 1 week after receipt in the laboratory; however, there are time limits for requesting some additional tests. For further information please refer to the Blood Test Bottle.
3.6.1 Secondary Care
If additional tests are required on a sample that has already been sent to the lab, then provided that the guidelines for time-limits of additional tests have been met, a request form should be sent to the lab. The request form should state any relevant clinical details and that there is a sample already in the laboratory. A phone call is NOT necessary unless the request is urgent.

3.6.2 Primary Care
Non-urgent add-on requests for additional biochemistry or haematology examinations should be made via the following e-mail address:

Hdd_Pembs.Haem_Biochem@wales.nhs.uk
The following information MUST be provided:
- Specimen number
- Patient Initials
- Tests required

3.7 Samples sent away by the Haematology Department
Test Sample Required (and special conditions)

- PVT
  4.5ml EDTA blood, DO NOT ‘FRIDGE’

- Thrombophilia screens
  For a full thrombophilia screen: 3 citrate (green top) Monovettes + 1 4.5ml clotted
  For individual parts of a screen ring special haematology
  If the patient is on full dose heparin antithrombin and lupus anticoagulant results are invalid
  If the patient is on warfarin protein c and s and lupus anticoagulant results are invalid. A 6 week delay should be allowed between stopping warfarin and requesting these investigations.

- ‘Antibody Tests’
  Autoantibody test – 4.5ml clotted blood
  Anti Nuclear factors 4.5ml clotted blood e.g. SSA, SSB, Ro, La, ENA, SC1 70, etc
  Intrinsic Factor Antibodies 4.5ml clotted blood
  Neutrophil Cytoplasmic antibodies 4.5ml clotted blood
  Malarial antibodies 4.5ml clotted blood. Also send 2 x thick & 2 x thin air dried blood films
  Muscle end-plate antibodies 4.5ml clotted blood
  Heart muscle antibodies 4.5ml clotted blood
  AntiCardiolipin 4.5ml clotted blood
  Adrenal antibodies 4.5ml clotted blood

- Cell Markers, Cytogenetics and Tissue typing
  Lymphocyte Markers 20ml EDTA blood. DO NOT ‘FRIDGE’. Not Fridays or w/e.
  Cytogenetics 15ml blood + 0.5ml preservative free heparin, Bone Marrow in Dulbecco’s medium with preservative free heparin. Transport must be organised for these samples.
  Chromosomes (not Haematology) 20ml heparinised blood. Not Fridays or w/e.
  HLA B27, 4.5ml of EDTA blood. Not Fridays where ever possible.
  HLA Tissue Typing, 5 x 10ml EDTA + 10ml CLOTTED ONLY BY PRIOR ARRANGEMENT WITH BTS. NB. Transport required.
  JAK – 5ml EDTA blood - UHW

- Haemoglobinopathy Investigations
  Hb electrophoresis, haemoglobin A2 and F quantitation. 4.5ml EDTA
  Globin chain synthesis 20ml heparinised blood. Do not collect into vacuum/evacuated tube. Only to
be sent by prior arrangement with Llandough Hospital
4 Referral Laboratories

Below is a list of laboratories used by the Biochemistry/Haematology departments for assays/tests not offered at this hospital. Please do not contact these laboratories/hospitals directly for the results of send-away tests as all results will be returned to the Biochemistry/Haematology departments at Withybush upon completion.

BIOCHEMISTRY DEPARTMENT
BRONGLAIS HOSPITAL
CARADOG ROAD
ABERYSTWYTH
CEREDIGION
SY23 1ER

BIOLAB MEDICAL UNIT
THE STONE HOUSE
9 WEYMOUTH STREET
LONDON W1W 6DB

REGIONAL ENDOCRINE LABORATORY
UNIVERSITY HOSPITALS BIRMINGHAM NHS FOUNDATION TRUST
CLINICAL LABORATORY SERVICES
LEVEL MINUS 1
QUEEN ELIZABETH HOSPITAL
BIRMINGHAM

IMMUNOLOGY DEPARTMENT
HEARTLANDS HOSPITAL
BORDESLEY GREEN EAST
BIRMINGHAM
B9 5SS

DEPARTMENT OF CLINICAL BIOCHEMISTRY
CITY HOSPITAL
DUDLEY ROAD
BIRMINGHAM
B18 7QH

CHEMICAL PATHOLOGY
PRINCESS OF WALES HOSPITAL
LITCHARD
BRIDGEND
CF3 11RQ

SOUTHMEAD HOSPITAL
WESTBURY-ON-TRYM
BRISTOL
BS10 5NB

INTERNATIONAL BLOOD GROUP REFERENCE LAB
SOUTHMEAD ROAD
BRISTOL
BS10 5ND

BLOOD SCIENCES HANDBOOK
REGIONAL IMMUNOLOGY SERVICE
BLOOD SERVICES SOUTH WEST
SOUTHEMEAD ROAD
BRISTOL
BS10 5ND

BIOCHEMISTRY AND IMMUNOLOGY DEPARTMENT
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

CELL IMMUNOPHENOTYPING
HAEMATOLOGY DEPARTMENT
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

COAGULATION LABORATORY
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

HAEMATOLOGY DEPARTMENT
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

HAEMOGLOBINOPATHY LABORATORY
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

LEUKAEMIA CYTOGENETICS LAB
HAEMATOLOGY DEPARTMENT
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

MOLECULAR DIAGNOSTICS
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF, CF4 4XN

THE DIAGNOSTIC LABORATORY
INSTITUTE OF MEDICAL GENETICS FOR WALES
UNIVERSITY HOSPITAL OF WALES
HEATH PARK
CARDIFF
CF4 4XW

RSR LIMITED
PARC TY GLAS
LLANISHEN
CARDIFF
CF4 5DU
Appendix One.

BIOCHEMISTRY/HAEMATOLOGY POLICY FOR PROCESSING OF ON-CALL SAMPLES

The On-call period is from 1800 – 0830 hours Monday to Friday and from 1800 Friday to 0830 Monday. On bank holidays the laboratory operates an on-call service only.

- **Contacting On-Call Staff**  
  Biochemistry and Haematology staff must be contacted via their respective bleep numbers out of hours or via switchboard.

- **0830 – Midnight**  
  On-call staff need only be contacted via bleep for requests if there is a true emergency. If no bleep is received, full blood counts, clotting screens, D-dimers and Biochemistry samples received within this time period will be processed and results available on the computer system normally within two hours.

- **Midnight – 0830**  
  On-call staff should only be contacted via bleep/switchboard if the results are required for the immediate management of the patient. If no contact is made, samples received between midnight and 0830 will be processed the following morning and results will be available by 0930. They may be available before then but the laboratory does not guarantee this.

- **Transfusion**  
  The on-call haematologist MUST ALWAYS be contacted via bleep/switchboard for transfusion requests.

- **Blood Gases**  
  The on-call biochemist MUST ALWAYS be contacted via bleep/switchboard for blood gas requests. During the night the Night Nurse Practitioners (NNP) are also able to process Blood Gas Requests. If however the NNP is busy, the on call Biochemist must be contacted as normal.

- **Troponin I Requests (Service offered between 0830 – 2300)**  
  Up until 2300 hours, troponin samples will be processed and the results available on the computer system normally within two hours, or possibly sooner if the on-call biochemistry BMS is bleeped.

Department policy at present is that on-call staff should be contacted by the responsible medical officer except in those emergency situations where resuscitation of the patient takes priority. This policy is strictly adhered to between midnight and 0830 hours. If, at any time, responsibility for contacting the on-call staff is delegated to non-medical staff, they must be able to pass on relevant clinical information, the doctors name and bleep number and understand the reason for the investigations so that this can be passed on to the laboratory staff.
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<thead>
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<th>Reviewed By</th>
<th>Signature</th>
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<td>H Albery</td>
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