**Haematology, Phlebotomy and Blood**

**Transfusion Handbook – Ipswich**

**Hospital**

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| **Date:** | **17/02/2022** |
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| **Summary of Changes:** |
| * **CR13664 Reticulocyte time limit for testing** * **CR13665 ACA reference range** * **CR13670 Section 11.4 (BT send away tests)** * **CR13769 Addition of new Senior to staff list** * **CR14530 PALS address** * **CR14637 Phlebotomy collection times** * **CR15204 Addition of Ascetic fluid to rest repertoire** |

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# INTRODUCTION

## PURPOSE AND SCOPE

This User Guide has been produced to assist both hospital and community users of the Haematology, phlebotomy and blood transfusion laboratory service at Ipswich Hospital. It deals with access to the service, specimen requirements, information and labelling requirements. If this User Guide fails to provide information required, users are encouraged to contact relevant key personnel listed.

The Pathology Laboratory at Ipswich Hospital consists of Biochemistry, Haematology, Microbiology, Histopathology/Cytopathology and Blood Transfusion and is the only pathology provision on-site. The service is provided by the East Suffolk North Essex NHS Foundation Trust which came into effect 1st July 2019.

## ResponsibilitY

It is the responsibility of management to effectively communicate information and sample requirements.

It is the responsibility of medical staff to give clinical advice where required.

It is the responsibility of senior technical staff to provide non clinical advice e.g. transport and packaging of samples.

It is the responsibility of clinical teams using the haematology service to follow the requirements laid out in this document.

## Related Documents

N/a

## References

ISO15189:2012

## DefinitionS

BMS: Biomedical Scientist

DPA: Data Protection Act

ESNEFT: East Suffolk and North Essex Foundation Trust

GDPR: General Data Protection Regulations

GP: General Practitioner

## HEALTH & SAFETY/RISK ASSESSMENT

# PROCESS

**2.1 Key Personnel and contact details**

The service is managed by East Suffolk and North Essex Foundation Trust. Key contacts are:

|  |  |  |
| --- | --- | --- |
| **Consultant Medical Staff** | **Bleep** | **Email and Telephone** |
| Dr A D Hodson Consultant Haematologist- ESNEFT Service Clinical Lead (Lab director) | 126 | [andrew.hodson@esneft.nhs.uk](mailto:andrew.hodson@esneft.nhs.uk) Contact via secretary 01473 703718 |
| Dr J. A. Ademokun Consultant Haematologist  Lead for Blood Transfusion Antenatal Sickle Cell and Thalassaemia Screening Clinical Lead | 160 | [debo.ademokun@esneft.nhs.uk](mailto:debo.ademokun@esneft.nhs.uk) Contact via secretary 01473 703718 |
| Dr I Chalmers Consultant Haematologist Clinical Lead | 125 | [isobel.chalmers@esneft.nhs.uk](mailto:isobel.chalmers@esneft.nhs.uk) Contact via secretary 01473 703718 |
| Dr I Whalley Consultant Haematologist Lead for Coagulation | 904 | [ioana.whalley@esneft.nhs.uk](mailto:ioana.whalley@esneft.nhs.uk) Contact via secretary 01473 703718 |
| Dr M Panatt Prahladan  Consultant Haematologist | 613 | [Mahesh.Prahladan@esneft.nhs.uk](mailto:Mahesh.Prahladan@esneft.nhs.uk)  Contact via secretary 01473 703718 |

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| **Biomedical Scientists** | **Email and Telephone** |
| Ms J Powell  Haematology and Blood Transfusion Service Manager | [Jackie.powell2@nhs.net](mailto:Jackie.powell2@nhs.net)  Tel: 01206 742407 |
| Mr S Bhattacharjee  Haematology Manager | [Shubendu.Bhattacharjee@esneft.nhs.uk](mailto:Shubendu.Bhattacharjee@esneft.nhs.uk)  Tel 01473 703714 (Internal ext. 5714) |
| Ms C Conway  Blood Transfusion Manager | [Camilla.smith1@nhs.net](mailto:Camilla.smith1@nhs.net)  Tel 01473 703396 (Internal ext. 5396) |
| Ms E Byworth  Blood Transfusion Compliance Manager | [Eleanor.byworth@esneft.nhs.uk](mailto:Eleanor.byworth@esneft.nhs.uk)  N/a |
| Ms J King Senior Biomedical Scientist  Antenatal Sickle Cell and Thalassaemia Screening Lead | [joanne.king@ipswichhospital.nhs.uk](mailto:joanne.king@ipswichhospital.nhs.uk)  Tel 01473 703396 (Internal ext. 5396) |
| Mrs L F Pacquette Senior Biomedical Scientist | [lucia.pacquette@ipswichhospital.nhs.uk](mailto:lucia.pacquette@ipswichhospital.nhs.uk) Tel 01473 703713 (Internal ext. 5713) |
| Mrs Claire Kelly Senior Biomedical Scientist | [claire.kelly@ipswichhospital.nhs.uk](mailto:claire.kelly@ipswichhospital.nhs.uk) Tel 01473 703713 (Internal ext. 5713) |
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| Mr C Smith  Senior Biomedical Scientist | [christopher.smith5@nhs.net](mailto:christopher.smith5@nhs.net)  Tel 01473 703713 (Internal ext. 5713) |
| Miss Lisa Lewis  Senior Biomedical Scientist | [Lisa.Lewis@esneft.nhs.uk](mailto:Lisa.Lewis@esneft.nhs.uk)  Tel: 01473 703396 (Internal ext. 5396) |
| Mr M Bowen  Senior Biomedical Scientist | [Mareece.bowen@esneft.nhs.uk](mailto:Mareece.bowen@esneft.nhs.uk)  Tel: 01473 703713 (Internal ext. 5713) |
| **Quality Team** | **Email and Telephone** |
| Mr Nigel Brinkley  Blood Transfusion Quality Manager | [nigel.brinkley@nhs.net](mailto:nigel.brinkley@nhs.net)  Tel 01473 703396 (Internal ext. 5396) |
| Mr Nick Sheppard  Blood Transfusion Quality Manager | [Nick.Sheppard@esneft.nhs.uk](mailto:Nick.Sheppard@esneft.nhs.uk)  Tel 01473 703396 (Internal ext. 5396) |
| Mr Richard Nevin  Haematology Quality Manager | [Richard.Nevin@esneft.nhs.uk](mailto:Richard.Nevin@esneft.nhs.uk)  Tel 01473 704171 (internal ext. 6171) |
| Mrs Sheila Cook  Phlebotomy Quality Lead | [Sheila.cook@esneft.nhs.uk](mailto:Sheila.cook@esneft.nhs.uk)  Tel 01473 704171 (internal ext. 6171) |

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| **Transfusion Practitioners** | **Bleep** | **Email and Telephone** |
| Ms R Smith  Transfusion Practitioner | 900 | [rebecca.smith@ipswichhospital.nhs.uk](mailto:rebecca.smith@ipswichhospital.nhs.uk) 01473 703391 (Internal ext. 5391) |
| Mrs S Kaznica Transfusion Practitioner | 900 | [sharon.kaznica@esneft.nhs.uk](mailto:sharon.kaznica@esneft.nhs.uk) Tel 01473 703391 (Internal ext. 5391) |
| Mrs S Clarke  Transfusion Practitioner | 900 | [sarah.clarke@esneft.nhs.uk](mailto:sarah.clarke@esneft.nhs.uk) Tel 01473 703391 (Internal ext. 5391) |

Department Telephone Numbers

|  |  |
| --- | --- |
| **Department** | **Telephone** |
| Haematology | |  |  |  | | --- | --- | --- | | External | 01473 703709 or 703710 | | | Internal | 5709 or 5710 | | |  | | |
| Blood Transfusion Enquiries (09.00 – 17.00 Monday – Friday)  Other times bleep 905 | |  |  | | --- | --- | | External | 01473 703726 | | Internal | 5726 | |  |  | |
| Secretary to Medical Staff (09.00 – 17.00 Monday – Friday) | |  |  | | --- | --- | | External | 01473 703718 | | Internal | 5718 | |  |  | |

## Data Protection and Patient Confidentiality

The EU General Data Protection Regulation (GDPR) is a pan-European data protection law, which superseded the EU’s 1995 Data Protection Directive and all member state law based on it, including the UK’s DPA 1998 (Data Protection Act 1998), on 25 May 2018.

The GDPR extends the data rights of individuals (data subjects), and places a range of new obligations on organisations that process EU residents’ personal data.

# Complaints

To make a complaint contact the Patient and Liaison Service (PALS) as follows:

## By phone

PALS can be contacted by telephone from 9am to 4pm, Monday to Friday

(Confidential answerphone out of hours)

Free phone 0800 783 7328   
Direct line 01206 742683 or 746448

If your call is urgent and you require assistance outside these hours please dial 01206 747474 and ask to speak to the Duty Matron.

## In writing

Patient Advice and Liaison Service   
Ipswich Hospital   
Heath Road

Ipswich

## By email

[PALS@esneft.nhs.uk](mailto:PALS@esneft.nhs.uk)

# Location of Laboratory

The Haematology Department is located in the Pathology Department at ESNEFT - Ipswich Hospital, Heath Road, Ipswich IP4 5PD – in the central zone.

For a location map click on the link below.

<https://i3a5v6j6.stackpathcdn.com/wp-content/uploads/2020/06/IPSWICH-2020June-Guide-Colour-002.pdf>

# Services Offered by the Laboratory

The Haematology Department offers the following services:

* Haematology   
  Blood Transfusion
* Antenatal Screening

The laboratory provides INR results to the Anticoagulation Monitoring Service (AMS).

Please contact the AMS directly for any queries relating to outpatient anticoagulant monitoring.

Tel: 01473 702677

For Immunology queries contact immunology at Addenbrookes Hospital directly.

Tel: 0333 103 2220

# Laboratory Opening Times

The Haematology laboratory is open 24 hours a day, 7 days a week. See below for opening times for phlebotomy services (blood tests).

# Out of Hours Service Provision

## Blood Transfusion

Anytime, in the event of an MHP bleep 905

Between 09:00 – 17:00, call Ext 5726

Between 17:00 – 09:00, bleep 905

## Haematology / Coagulation

Anytime, call Ext 5709

All Emergency Department (A&E) requests where there is a likelihood of 4 hour breach must be notified by telephone/bleep to the relevant department.

# Clinical Advice and Interpretation

Clinical advice is available from the consultant medical staff and from the consultant on call during evenings and weekends via switch. Non clinical advice is available from senior BMS staff

# Information for Patients and Visitors

Patients requiring information on preparing to visit Ipswich Hospital should see the hospital’s internet pages.

# Patient Consent

East Suffolk and North Essex NHS Foundation Trust (ESNEFT) is committed to ensuring that all staff involved in the patient consent process adhere to the Department of Health guidance on consent to examination and treatment.

Patients have a fundamental legal and ethical right to determine what happens to their own bodies. Valid consent must be obtained before starting treatment or physical investigation, or providing personal care, for a person, and is a fundamental part of good practice. A healthcare professional (or other healthcare staff) who does not respect this principle may be liable both to legal action by the patient and to action by their professional body.

Consent is presumed with regards blood tests when the sample and request form – containing the requestor details – arrives in the laboratory.

Phlebotomy presume consent when the patient arrives for the phlebotomy appointment with a completed request form and presents for venepuncture.

## Outpatients

An appointment system is in place for community and out-patient department phlebotomy and can be accessed by following the link below:

<https://www.esneft.nhs.uk/service/bloodtests/>

Phlebotomy appointment: Landseer Road Phlebotomy Clinic, 476-478 Landseer Road Ipswich Suffolk IP3 9LU Monday to Friday 07:30 – 17:30 (Children aged 11 – 16).

Laboratory Phlebotomist Opening Hours (hospital): The laboratory open hours are Monday – Friday 07:30 – 17:45.

Children under 11 years of age should not be referred for blood tests to the department but arrangements can be made with the Paediatric Assessment Unit (telephone 01473 702198 for advice).

## Inpatients

The phlebotomists visit all the wards with the exception of paediatric wards on a daily basis between 07.30 and 12:00. They are unable to return to wards, so all requests forms should be available from 07.30. Please do not forward order unnecessarily as the presence of large numbers of forms on the request clip delays the round. A Saturday and Sunday morning service is provided for the acute medical and surgical wards from 07:30 to 11:30. Please keep weekend ordering to a minimum, i.e. clinically essential orders only.

The phlebotomists will only have two attempts at venepuncture and if unsuccessful will refer the request back to the originator.

# The Request Form & Sample

## Request Form

Electronic request forms (Lorenzo or ICE) should be used whenever possible. It is essential that the request form bears - as an absolute minimum - the patient’s name, case number (whenever this is available, or address if the hospital number is not known), time of sampling, date, the signature of the person making the request and the location to which the report is to be sent.

All requests sent to the laboratory are considered a service agreement between the requester and the laboratory to undertake the analysis of the sample for the tests requested. The laboratory may refer the sample to another laboratory for specialised or confirmatory analysis in order to provide the results.

All antenatal screening requests must be accompanied with a fully completed family origin questionnaire & possibly orange antenatal booking form. This must contain the estimated delivery date and ethnic origin of the parents.

### **Patient's Gender**

Please complete as gender not always easy to ascertain from name and is essential for interpretation of results.

### **Requester Details**

Clearly identify the name and location of the requester and the location for copies of the report to be sent if required.

### **Tests Required**

Tests required must be entered.

### **Clinical Details**

Appropriate clinical details to enable accurate interpretation of findings. Note Blood Transfusion send away tests may need discussion with Haematology Consultant.

### **Priority Status**

Requests are assumed routine unless marked 'URGENT' or 'PLEASE PHONE', a telephone number or bleep number must be stated to reduce delays in contacting the requester.

Electronic request forms must be completed as prompted on screen.

## Samples

### **Minimum Labelling Criteria for Haematology Samples**

The minimum labelling criteria for Haematology samples is surname, forename, date of birth plus one of the following: hospital number or NHS number.

### **Specific Requirements for Blood Transfusion Samples**

All blood transfusion samples must be labelled by hand. The minimum criteria is full name (surname and first name), hospital number or NHS number, date of birth, date and time of collection and the sample must be signed by the person who took the sample. Failure to meet these labelling criteria will result in the specimen being rejected.

### **Minimum Labelling Criteria for Maternal Serum Screen Samples**

Samples for Maternal Serum Screen must include; the patient surname and either the hospital number or NHS number as one of the three patient identifiers.

## Sample Rejection

Samples may be rejected due to minimum labelling criteria above not being met, or due to issues with sample integrity (e.g. haemolysis, icterus etc.). The requestor will be notified when an urgent sample is rejected.

## Samples for Send Away Tests

Samples for leukaemia Immunophenotyping / cell markers (BCR / ABL, JAK2, PNH Screen, EMA dye test and FISH), genetics / chromosomes (HFGE and HFE) and tissue typing (HLA and HLA B27) must contain four points of reference, e.g. full name (surname and first name), hospital number or NHS number and date of birth and be sent with a Haemato-Oncology Diagnostic Service (HODS) form.

Send away samples for Blood Transfusion (for example, HIT, NAIT, etc.) must be signed by the requestor and be accompanied by the appropriate NHSBT request form (available by request from the Blood Transfusion Department)

## High Risk Samples

High Risk samples from patients with (or suspected to have) Creutzfeldt- Jacob Disease (CJD), Transmissible Spongiform Encephalitis (TSE), Ebola, Viral Haemorrhagic Fever, or Rabies must be labelled clearly with Danger of Infection on the request form and sample bags. The Laboratory must be notified that the samples are coming prior to collection and the request must be discussed with the relevant consultant. All samples from these patients must be sent in the Red High Risk Transporter Boxes available from Pathology.

# Outline of Tests Provided

## Haematology

FBC, ESR, malaria screening, CSF morphology for malignant cells, glandular fever screening, sickle screening, G-6-PD deficiency screening, haemoglobinopathy screening, and leukaemia diagnosis (referred out test).

## Coagulation

Coagulation screening, heparin and warfarin monitoring for inpatients, d-dimer assay, factor assays and thrombophilia screening.

## Transfusion

Blood group and antibody screen, provision of blood and blood products, antenatal blood group serology, maternal and cord testing post-delivery, Kleihauer testing and investigation of neonatal jaundice.

The Ipswich Hospital Blood Policy covers all aspects of blood transfusion including ordering of blood, blood products, information on transfusion and procedure to follow after a possible transfusion reaction.

# Samples Required

Sample collection is standardised on the Sarstedt Monovette system and samples should be collected only in these containers. For paediatric haematology and coagulation samples, small volume tubes of the same range are available. 1.6ml blue topped tubes are available for paediatric use for the blood transfusion department.

This is not a complete list of tests; a full list of tests can be found in the Sample Requirements of the ESNEFT Pathology Website:

<https://esneftpathology.nhs.uk/>

For immunology queries contact the Immunology Department at Addenbrookes Hospital directly.

Tel: 01223 245151 / 0333 103 2220

# Summary of Tests Referred to Other Laboratories

Tests not available at Ipswich Hospital are referred to selected laboratories for testing. Samples to be sent to the Regional Genetics/Cytogenetics Laboratory at Cambridge, HODS at Addenbrookes and Tissue Typing at Addenbrookes, require specific request forms to be completed, which can be downloaded from:

<https://www.cuh.nhs.uk/addenbrookes-hospital/services/genetics-laboratories/sample-requirements-and-test-request-card/request-card-labelling-and-consent>

|  |  |
| --- | --- |
| **Test** | **Sent To** |
| Genetic and chromosome studies | Regional Genetics/Cytogenetics Laboratory, Cambridge |
| Leukaemia diagnosis | HODS, Addenbrookes |
| Neurological gene assays | Rare & Inherited Disease Laboratory of the London North Genomic Laboratory Hub |
| Neurological antibodies | Rare & Inherited Disease Laboratory of the London North Genomic Laboratory Hub |
| Immunology | Immunology, Addenbrookes |
| Platelet Function | Coagulation, Addenbrookes |
| HLA typing | Tissue Typing, Addenbrookes |
| Platelet, WBC and RBC serological investigations, antenatal antibody serology | NHS Blood and Transplant  (Colindale & Filton) |
| EPO assay | Biochemistry, Kings College Hospital |

# Range of Tests Available Outside Core Hours

* Full blood counts and blood film where appropriate
* Screening for malarial parasites
* ESR
* Coagulation screen, D-dimer, INR and APTT , anti-FXa (Hep)
* Provision of blood and blood products
* Kleihauer test
* Blood group and DAT (direct antiglobulin test) on babies
* All other requests should be discussed with the BMS on duty or consultant haematologist on call.

# Transport of Samples

## Transport of Samples from GP Surgeries

The Pathology Department provides a daily collection service from all GP surgeries. Samples for collection should be individually bagged then placed in a large sealed plastic bag with sufficient wadding to absorb spills.

## Transport of Samples from Wards

Samples for collection should be individually bagged then placed in a large sealed plastic bag with sufficient wadding to absorb spills. The large bag should be delivered to the pathology reception by the portering staff.

## Transport of Samples via Air Tube

Samples transported via the air tube must be placed in a sealed plastic sample bag with the request form in a separate pocket to the sample. Samples should be sent to either the haematology or blood transfusion stations. All haematology samples may be sent via the air tube system (except High Risk Samples, CSF or samples for platelet function, which should be delivered by hand).

## Extremes of Temperature

Avoid extremes of temperature when transporting samples to avoid sample deterioration.

# Storage of Samples

If possible deliver sample to the laboratory the same day, all wards samples should reach the laboratory within a few hours of collection. Samples from outside the hospital that cannot be delivered that day should be stored in a refrigerator overnight and delivered the next morning. The refrigerator should maintain a temperature between 2oC and 8oC, it is especially important that the samples do not freeze.

Incorrectly stored samples may result in sample deterioration as seen by prolonged clotting times, degenerate blood films, loss of antibody strength and haemolysed samples, for example.

# Turnaround Times

These times refer to the time from receipt of a sample in the department to validation (or interim validation) of a result which then becomes available electronically.

|  |  |  |
| --- | --- | --- |
| **Test** | **Urgent** | **Routine** |
| Full blood count | 1 hour | 24 hours3 |
| Ascetic Fluid | N/A | 24 hours3 |
| Peripheral blood films | 24 hours3 | 48 hours3 |
| Malarial parasites | 2 hours |  |
| G-6-PD | N/A | 3 days |
| ESR | 2 hours | 24 hours |
| Clotting screen | 1 hour | 4 hours |
| D-dimer | 1 hour | 4 hours |
| CSF and other fluids | 1 hour | 3 days |
| Glandular fever screen | 1 hour | 3 days |
| Haemoglobinopathy screen\* | 1 day | 14 days |
| Coagulation factor assays\*  (excluding VWF Antigen and Activity) | 24 hours | 7 days |
| VWF Antigen and Activity\* | 2 days | 7 days |
| Thrombophilia screen\* | 1 day | 14 days |
| Emergency provision of blood (if previously grouped and antibody screened negative) | 10 minutes | N/A |
| Provision of blood (if NOT previously grouped and antibody screened) | 60 min (provided no antibodies detected)1 | N/A |
| Provision of fully Crossmatched Blood (if previously grouped and antibody screen is positive or known antibodies) | Variable, contact department for advice2 | N/A |
| Provision of blood products FFP Platelets Cryoprecipitate Fractionated and recombinant products (e.g. prothrombin complex, human albumin etc.) | 40 min Contact department 40 min 10 min | N/A |
| Maternal and cord post-delivery testing | N/A | 2.5 days |
| Kleihauer film\* | 1 hour | 2.5 days |
| Investigation of neonatal jaundice | 1 hour | 1 day |
| Blood group and antibody screen | 1 hour | 2 days |
| Immunology Autoimmune assay\* | 1 day | 7 days |
| Allergy | N/A | 14 days |

\* Urgent requests must be discussed with consultant haematologist  
1 If antibodies are present the provision of compatible blood cannot be guaranteed  
2 When antibodies are known to be present Blood Transfusion must be contacted as soon as possible; non urgent treatment should be delayed until blood is available.

3 Clinically urgent results will be phoned without delay

# Time Limits for Further Requesting of Tests

Further tests may be added to existing samples held in the department provided:

a) The request is made within the time limits stated below   
b) There is sufficient sample for the test   
  
Requests should be made to Haematology Reception.

|  |  |  |
| --- | --- | --- |
| Original Sample | Other tests possible to request | Time limit for additional tests |
| FBC | Blood film, G6PD, malarial parasites. haemoglobinopathy screening | 24 hrs |
| FBC | ESR | 21 hrs |
| FBC | Reticulocytes | 96 hrs |
| Coagulation Screen | D-Dimer | 24 hrs |
| Coagulation Screen | Factor assays | 4 hrs |
| APTT | INR | 72 hrs |
| Immunology | Additional immunology | 28 days |

# Factors Affecting the Performance of the Tests

The quality of the results obtained can be affected by the quality of the sample received.

## Blood sampling

Blood should be collected into Sarstedt blood tubes directly by clean venepuncture with minimum cuff pressure and not filled from a syringe. After collection mix samples gently avoid vigorous shaking. Check the expiry date of sample vials before use. These blood tubes must not have been exposed to extremes of temperature prior to collection (above 30oC)

If used correctly the correct volume of blood will be collected, this is essential for coagulation and ESR tests.

Coagulation tests, other than basic clotting screen, APTT and INR, are best collected in the hospital to ensure minimum delay in the sample reaching the laboratory. Samples from wards should be delivered immediately to the laboratory.

Results of poor sampling will include haemolysed samples, activated coagulation samples, and partially clotted samples all of which can affect the result obtained.

# Quality Standards

The Haematology Department is accredited by the following professional, accreditation and regulatory bodies:

## IBMS (Institute of Biomedical Sciences)

[(http://www.ibms.org/)](http://www.ibms.org/)

The department is approved for pre-registration and post-registration BMS training and support staff training.

## MHRA (Medicines and Healthcare Products Regulatory Agency)

[(http://www.mhra.gov.uk/)](http://www.mhra.gov.uk/)

Compliance assessed annually by MHRA

## UKAS (United Kingdom Accreditation Service)

<https://www.ukas.com>   
Accredited to ISO 15189:2012

Reference no. 9332

# Related Documents

* Blood Policy – See Trust webpages
* Pathology Laboratory Guide (Sample Requirements)

# Reference Ranges

All numerical results have reference ranges printed on the report with the result. Reference ranges may be sex and age related.

## Summary of the Main Adult Reference Ranges

NOTE: Paediatric and gender reference values may be different from adult ranges contact department for details.

## Haematology

|  |  |  |
| --- | --- | --- |
| **Assay** | **Reference Range** | **Reporting Units** |
|  | | |
| FBC - Hb | 115 – 160 (F) 135 – 175 (M) | g/l |
| - WBC | 4.0 – 11.0 | X109/l |
| - Platelets | 135 – 450 | X109/l |
| - RBC | 3.8 – 4.8 (F) 4.5 – 5.5 (M) | X1012/l |
| - Hct | 0.35 – 0.45 (F) 0.38 – 0.50 (M) |  |
| - MCV | 80 – 100 | fl |
| - MCH | 27.0 – 34.0 | pg |
| - Neutrophils | 2.0 – 7.5 | X109/l |
| - Lymphocytes | 1.0 – 4.0 | X109/l |
| - Monocytes | 0.1 – 1.0 | X109/l |
| - Eosinophils | 0.0 – 0.5 | X109/l |
| - Basophils | 0.0 – 0.2 | X109/l |
| - Reticulocytes | 10-100 (0-16)  10-100 (17-120) | X109/l  X109/l |
| ESR | |  |  | | --- | --- | | Female | | | Aged 0-60: | 1-19 | | Aged 61-70: | 1-20 | | Aged 71-120: | 1-35 | | Male | | | Aged 0-50: | 1-10 | | Aged 51-60: | 1-12 | | Aged 61-70: | 1-14 | | Aged 71-120: | 1-30 | | mm/hr |

|  |  |  |
| --- | --- | --- |
| Coagulation | | |
| **Assay** | **Reference Range** | **Reporting Units** |
| Clotting Screen - INR | 0.9 – 1.2 | Ratio |
| - PT | 11 – 15 | sec |
| - APTT | 26 – 37 | sec |
| - Fibrinogen | 2.0 – 4.5 | g/l |
| \*D-dimer (for exclusion of DVT/PE) | <500 | ng/ml (FEU) |
| Thrombin Time | 10.5 – 16.5 | secs |
| Coagulation factors |  |  |
| - II | 0.5 – 1.5 | u/ml |
| - V | 0.5 – 1.5 | u/ml |
| - VII | 0.5 – 1.5 | u/ml |
| - VIII | 0.5 – 1.5 | u/ml |
| - IX | 0.5 – 1.5 | u/ml |
| - X | 0.5 – 1.5 | u/ml |
| - XI | 0.7 – 1.5 | u/ml |
| - XII | 0.7 – 1.5 | u/ml |
| - XIII | 0.5 – 1.4 | u/ml |
| - VWF Antigen | Blood Group A, B and AB: 0.66 – 1.76  Blood Group O: 0.42 – 1.41 | u/ml  u/ml |
| - VWF Activity | Blood Group A, B and AB: 0.49 – 1.63 Blood Group O: 0.40 – 1.26 | u/ml  u/ml |
| Thrombophilia |  |  |
| - Antithrombin | 75 – 125 | IU/dl |
| - Protein C | 70 – 130 | IU/dl |
| - Free Protein S | 55 – 125 (F) 75 – 145 (M) | IU/dl |
| - APCR ratio | 2.0 – 3.5 |  |
| - DRVVT ratio | <1.2 |  |
| - Corrected DRVVT ratio | <1.2 |  |
| - DRVVT ratio/ Corrected DRVVT ratio | <1.2 |  |
| - Cardiolipin Ab IgM | 0 – 9 | MPL u/ml |
| - Cardiolipin Ab IgG | 0 – 9 | GPL u/ml |
| - β2 Glycoprotein Ab IgM | 0 – 6 | u/ml |
| - β2 Glycoprotein Ab IgG | 0 – 6 | u/ml |

***\*****Note change to reportable units from non FEU to FEU and change to negative cut off value for VTE*

|  |  |  |
| --- | --- | --- |
| Special Haematology | | |
| **Assay** | **Reference Range** | **Reporting Units** |
| HbA2 | 2.2 -- 3.5 | % |
| Hb F | 0 – 1.0 | % |
| G6-PDH | 5.2 - 11.6 | IU/gHb |