



Haematology, Blood Transfusion and Phlebotomy User Guide – Colchester Hospital		 East Suffolk and North Essex NHS Foundation Trust
HAT-COL-INFO-11		
Colchester/Haem, BT, Phlebotomy		
Version: 1.9	Issue Date: See Q-Pulse	

Haematology, Blood Transfusion and Phlebotomy User Guide – Colchester Hospital


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Summary of Changes:
<ul style="list-style-type: none"> • Section 2.11.1: added <i>P.knowlesi</i> as a limitation to the RDT for malaria • Section 2.21.1: added reference for stated reference ranges • Section 2.12: added link to Order of Draw for Phlebotomy

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1 INTRODUCTION

1.1 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 Colchester 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 Colchester 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.

1.2 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, Blood Transfusion and Phlebotomy services to follow the requirements laid out in this document.

1.3 RELATED DOCUMENTS

PATH-ALL-EXT-55	General Data Protection Regulations 2018	
ESNEFT document 3271	Venepuncture Policy	Trust Intranet
ESNEFT document 3805	The Blood Policy	Trust Intranet

1.4 REFERENCES

ISO15189:2012

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1.5 DEFINITIONS

BMS	Biomedical Scientist
DPA	Data Protection Act
ESNEFT	East Suffolk and North Essex Foundation Trust
GDPR	General Data Protection Regulations
GP	General Practitioner
MHP	Major Haemorrhage Protocol

1.6 HEALTH & SAFETY/RISK ASSESSMENT


N/A

2 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 M Mohan Consultant Haematologist Clinical lead for Blood Transfusion	914	Mahalakshmi.Mohan@esneft.nhs.uk Contact via secretary 01206 746162
Dr K Saja Consultant Haematologist Clinical Lead Haematology	497	khalidfahad.saja@esneft.nhs.uk Contact via secretary 01206 745337
Dr G Campbell Consultant Haematologist	252	Gavin.Campbell@esneft.nhs.uk Contact via secretary 01206 745345
Dr J Padayatty Consultant Haematologist	161	Joseph.Padayatty@esneft.nhs.uk Contact via secretary 01206 745345
Dr A Robinson Consultant Haematologist (start date 03/04/2023)	199	Andrew.Robinson@esneft.nhs.uk Contact via secretary 01206 745337

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Biomedical Scientists	Email and Telephone
Sarah Stalley Head of Operations	Sarah.Stalley@esneft.nhs.uk Tel: 01473 703707
Jackie Powell Haematology and Blood Transfusion Service Manager	Jackie.Powell@esneft.nhs.uk Tel: 01206 742407
Wayne Jones Haematology Manager	Wayne.Jones@esneft.nhs.uk Tel 01206 742406 (int ext. 2406)
Mohammed Elkarim Transfusion Laboratory Manager	Mohammed.Elkarim@esneft.nhs.uk Tel 01206 742078 (int ext. 2078)
Eleanor Byworth Transfusion Compliance Manager	Eleanor.Byworth@esneft.nhs.uk
Nigel Brinkley Blood Transfusion Quality Manager	Nigel.Brinkley@esneft.nhs.uk Tel 01473 703396 (Int ext. 5396)
Nick Sheppard Blood Transfusion Quality Manager	Nick.Sheppard@esneft.nhs.uk Tel 01473 703396 (Int ext. 5396)
Richard Nevin Haematology Quality Manager	Richard.Nevin@esneft.nhs.uk Tel 01473 704171 (int ext. 6171)
Sheila Cook Phlebotomy Quality Lead	Sheila.Cook@esneft.nhs.uk Tel 01473 704171 (int ext. 6171)
Shelley Garrey Support Services Lead	Shelley.Garrey@esneft.nhs.uk
Emma Madden Pathology Customer Services Manager	Emma.Madden@esneft.nhs.uk
Rob Binns Interim Phlebotomy Manager	Robert.Binns@esneft.nhs.uk
Chris Sheed Advanced Biomedical Scientist Haematology	Chris.sheed@esneft.nhs.uk Tel 01206 742404 (int ext. 2404)
Kathryn Hurst Advanced Biomedical Scientist Haematology	Kathryn.Hurst@esneft.nhs.uk Tel 01206 742404 (int ext. 2404)
Mohammed Pasha Advanced Biomedical Scientist Blood Transfusion	Mohammed.Pasha@esneft.nhs.uk Tel 01206 742402 (int ext. 2402)

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Transfusion Practitioner	Bleep	Email and Telephone
Rebecca Smith Transfusion Practitioner (Based at Ipswich, providing interim cover for Colchester site)	458	Rebecaa.Smith53@esneft.nhs.uk Tel: 01473 703391


Department	Telephone
Haematology	External 01206 742404/5 Internal 2404/5
Blood Transfusion	External 01206 742402 Internal 2402
Secretary to Medical Staff (Monday to Friday 09:00-17:00)	Dr Saja / Dr Robinson 01206 745337 Dr Campbell/Dr Padayatty 01206 745345 Dr Mohan 01206 746162

2.2 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.

Refer to PATH-ALL-EXT-55, General Data Protection Regulations 2018, on Q-Pulse for further information.

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2.3 Complaints

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

2.3.1 By phone

PALS can be contacted by telephone from 09:00 – 16:00, Monday to Friday (confidential answerphone out of hours).

Free phone 0800 783 7328
Direct line 01206 742683 or 746448
Internal ext. 2683 or 6448

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

2.3.2 By Email

Specify in the subject field of your email whether your email relates to Colchester or Ipswich Hospital.

Email: pals@esneft.nhs.uk

2.3.3 In Writing

Send correspondence to:

Patient Advice and Liaison Service (PALS)
Colchester Hospital
Turner Road
Colchester
Essex
CO4 5JL


2.4 Location of Laboratory

The Haematology and Blood Transfusion department is located in the Blood Sciences department, 1st floor main building, Colchester Hospital

The Phlebotomy department is located on the ground floor, main building, Colchester Hospital

For a location map click on the link below:

<https://docreader.reciteme.com/doc/view/id/5f9803e8ae9f9>

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2.5 Services Offered by the Laboratory

The Haematology Department offers the following services:

Haematology
Blood Transfusion

For Immunology queries contact immunology at Ipswich Hospital directly on 01473 703356 (Monday to Friday).

2.6 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).

2.6.1 Out of Hours Service Provision

In the event of an MHP anytime, phone 2088

The phone is answered in Blood Sciences 08:00 – 18:30 Monday to Friday and 09:00 – 12:00 at weekends.

The phone is answered in Blood Transfusion 09:00 – 17:00 Monday to Friday.

Haematology ext.: 2415

Blood transfusion ext.: 2402


At all other times for Haematology and Blood Transfusion: bleep 854

2.7 Clinical Advice and Interpretation

Clinical advice is available from the consultant medical staff and from the consultant on call during evenings and weekends via the hospital switchboard. Non clinical advice is available from senior BMS staff. Clinical Immunology advice is available by emailing BHNT.Immunology@nhs.net or calling Barts Hospital on telephone number 020 7377 7000

2.8 Information for Patients and Visitors

Patients requiring information on preparing to visit Colchester Hospital should see the hospital's ESNEFT internet pages.

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2.9 Patient Consent

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.

2.9.1 Outpatients


An appointment system is in place for all areas including inpatients who need to be seen by the phlebotomy team and can be accessed by following the link below:

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

Patients must book an appointment using the link above, or call 0300 303 5299. Walk-in appointments are no longer available. Appointments are available at the following sites:

Site	Opening Hours
Colchester Hospital, Blood Clinic, Ground Floor	Monday – Friday 08:15 – 18:00
Primary Care Centre, Turner Road, Colchester	Monday – Friday 07:15 – 14:00
Clacton Hospital, Blood Clinic, Ground Floor	Monday – Friday 08:00 – 19:30 Saturday and Sunday 08:00 – 14:00
Harwich Hospital, Blood Clinic, Ground Floor	Tuesday 09:30 – 12:30

For children up to the age of 6, appointments for blood tests must be made with the Children's Day Unit with a referral from the GP. Children up to the age of 18 may also use this service.

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2.9.2 Inpatients

The phlebotomists visit all the wards with the exception of paediatric wards on a daily basis between 08:00 and 12:00. They are unable to return to wards, so all requests should be placed using CareFlow Order Comms by 07:00am.(N.B. Blood Transfusion requests are still in paper form). Please do not forward order unnecessarily and only when clinically required.

A Saturday and Sunday morning service is provided for the acute medical and surgical wards from 07:30 to 10:30. 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.

2.10 The Request Form and Sample

2.10.1 Request Form

Electronic request forms should be used whenever possible (except for Blood Transfusion where manual requests are required). It is essential that the request form bears - as an absolute minimum - the patient's name, Date of birth, case or NHS 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.

Antenatal screening requests


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

Gender

Please complete as gender should never be ascertained from name and is essential for interpretation of results and release of appropriate blood products.

Requestor details

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

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Tests required

Tests required must be entered.

Clinical details

Appropriate clinical details must be provided to enable accurate interpretation of findings.

Priority status

Requests are assumed routine unless marked 'URGENT'. A telephone number or bleep number is useful to reduce delays in contacting the requester to communicate urgent results. Electronic request forms must be completed as prompted on screen.

2.10.2 Samples

2.10.2.1 Minimum labelling criteria for Haematology samples

The minimum labelling criteria for Haematology samples is FORENAME, SURNAME, DATE OF BIRTH and one of the following HOSPITAL NUMBER or NHS NUMBER.

2.10.2.2 Minimum labelling criteria for Blood Transfusion samples


All Blood Transfusion samples must be labelled by hand by the person taking the sample. The minimum labelling criteria for Blood Transfusion samples is FORENAME, SURNAME, DATE OF BIRTH, HOSPITAL NUMBER OR NHS NUMBER, DATE AND TIME OF SAMPLE COLLECTION and the sample must be SIGNED BY THE PERSON WHO TOOK THE BLOOD. Failure to meet these criteria will result in the specimen being rejected. Amendments to labelling of the sample are not acceptable and the sample will be rejected.

2.10.3 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.

2.10.4 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. These requests will be sent Barts Health NHS Trust for testing as part of our shared care agreement plan.

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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).

2.10.5 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 Microbiology / Virology Consultant.

2.11 Outline of tests provided

2.11.1 Haematology

FBC, blood film, Retics, ESR, malaria screening (Rapid Diagnostic Test (RDT) and film examination, note the RDT kit does not detect *P.knowlesi*), IM (glandular fever) screening, sickle screening, bone marrow aspirate

G-6-PD deficiency screening, haemoglobinopathy screening (referred to Ipswich Hospital).

2.11.2 Coagulation

Clotting screen, D-dimer, fibrinogen, heparin and warfarin monitoring for inpatients, DOAC assays (Apixaban, Rivaroxaban, Edoxaban) factor assays, von Willebrand Disease (VWD) screen and lupus.

Thrombophilia screen (referred to Ipswich Hospital).


2.11.3 Transfusion

Blood group and antibody screen, direct antiglobulin test (DAT), provision of blood and blood products, antenatal blood group serology, maternal and cord testing post-delivery, Kleihauer testing and investigation of neonatal jaundice.

The Blood Policy (ESNEFT document 3805) covers all aspects of blood transfusion including ordering of blood, blood products, information on transfusion and procedure to follow after a possible transfusion reaction.

2.12 Sample Requirements

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

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paediatric use for the blood transfusion department and may be ordered via the Transfusion Practitioner (TP).

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/>

The order of draw can be found in the Phlebotomy section of the above website, or using the following link:

<https://esneftpathology.nhs.uk/wp-content/uploads/2023/05/Order-of-Draw-ESNEFT.pdf>


For immunology sample queries contact the Immunology Department at Ipswich. For clinical Immunology advice contact Barts directly on telephone number 020 7377 7000 or email BHNT.Immunology@nhs.net

2.13 Summary of Tests Referred to Other Laboratories

Tests not available at Colchester 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	Queens Square, London Radcliffe Hospital, Oxford
Neurological antibodies	Queens Square, London Radcliffe Hospital, Oxford
Immunology routine	Ipswich Immunology, Blood Sciences
Immunology non-routine	Immunology, Barts
Platelet Function	Coagulation, Addenbrookes
HLA typing	Tissue Typing, Addenbrookes
Platelet, WBC and RBC serological investigations, antenatal antibody serology	NHS Blood and Transplant (Colindale & Filton)

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EPO assay	Biochemistry, Kings College Hospital
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2.14 Range of Tests Available Outside Core Hours

- Full blood counts and blood film where appropriate
- Screening for malarial parasites
- ESR
- Coagulation screen (PT and APTT), INR, APTR, D-dimer, fibrinogen
- Anti-Xa (Heparin assay)
- Sick cell screening test
- Provision of blood and blood products
- Kleihauer test (not performed overnight)
- 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.

2.15 Transport of Samples

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

2.15.1 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.

2.15.2 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.

2.15.3 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. The sample must then be placed in a carrier which must be correctly sealed. The system will detect the chip present in the carrier – which is specific to the originating location. Samples should be sent to the blood science station. All haematology and blood transfusion 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).

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2.16 Storage of Samples


Samples should be delivered to the laboratory on the day of collection; all ward 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 and within 24 hours of collection. The refrigerator should maintain a temperature between 2°C and 8°C, 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. These samples will be rejected with a suitable comment.

2.17 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. Where the turnaround times are stated in days this refers to working days.

Test	Urgent	Routine
Full blood count	1 hour	24 hours ³
Peripheral blood films	24 hours ³	48 hours ³
Malarial parasites	2 hours	N/A
G-6-PD	N/A	3 days
ESR	2 hours	24 hours
Clotting screen	1 hour	4 hours
D-dimer	1 hour	4 hours
Glandular fever screen	1 hour	3 days
Sickle cell screen	1 hour	1 day
Bone marrow aspirate	N/A	12 days
Coagulation factor assays* (excluding VWF Antigen and Activity)	24 hours	7 days
VWF Antigen and Activity*	2 days	7 days
Emergency provision of blood (if previously grouped and antibody screened negative)	10 minutes	N/A

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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 advice ²	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	3 days
Kleihauer film*	N/A	3 days
Investigation of neonatal jaundice (DAT)	1 hour	1 day
Blood group and antibody screen	1 hour	2 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.

⁴Where days are mentioned – this refers to working days


2.18 Time limits for Further Requesting of Tests

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

- The request is made within the time limits stated below
- There is sufficient sample for the test

Requests should be made to using the 'Addition of tests form for Blood Sciences' form.

Original Sample	Other tests possible to request	Time limit for additional tests
FBC	Blood film	24 hrs
FBC	G6PD	24 hrs
FBC	Malarial parasites	12 hrs

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FBC	Haemoglobinopathy screening / sickle cell screen	24 hrs
FBC	ESR	21 hrs
FBC	Reticulocytes	24 hrs
Coagulation Screen	D-Dimer	12 hrs
Coagulation Screen	Factor assays	4 hrs
Immunology	Additional immunology	28 days

2.19 Factors Affecting the Performance of the Tests

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

Quality of results may also be affected by sample storage conditions when not within the laboratory.

2.19.1 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 and 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 30°C). Samples should be sent to the laboratory as soon after venepuncture as possible to avoid any sample degradation.


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.

2.20 Quality Standards

The blood transfusion service is regulated by the MHRA (Medicines and Healthcare Products Regulatory Agency). Compliance is assessed annually by MHRA.

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2.21 Reference Ranges

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

2.21.1 Summary of Main Adult Reference Ranges


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

HAEMATOLOGY - FBC:

Parameter (units)	FEMALE	MALE
	18 – 120 Years	
HB (g/L)	115 – 165	130 – 180
RBC (x10 ¹² /L)	3.8 – 4.8	4.5 – 6.5
MCV (fL)	80 - 100	
HCT (L/L)	0.37 – 0.47	0.40 – 0.50
RDW (%)	10 - 15	
PLT (x10 ⁹ /L)	135 – 450	
MCH (pg)	27 - 34	
MCHC (g/L)	300 - 360	
RET# (x10 ⁹ /L)	30 - 100	
WBC (x10 ⁹ /L)	4.0 – 11.0	
NEUT# (x10 ⁹ /L)	2.0 – 7.5	
LYM# (x10 ⁹ /L)	1.0 – 4.0	
MONO# (x10 ⁹ /L)	0.2 – 1.0	
EOS# (x10 ⁹ /L)	0.0 – 0.5	
BASO# (x10 ⁹ /L)	0.02 – 0.1	

ESR:

Age	FEMALE	MALE
0-15 Years	3 – 15	

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16-50 Years	0 – 20	0 – 15
51-120 Years	0 – 30	0 – 20
Unknown	1 – 30	1 – 20

COAGULATION

Parameter (units)	MALE AND FEMALE – COAGULATION
	6 Months – 120 Years
PT (s)	10.0 – 15.0
APTT (s)	25.0 – 36.0
PT 50:50 mix (s)	10.0 – 15.0
APTT 50:50 mix (s)	25.0 – 36.0
INR (ratio)	0.9 – 1.2
APTR (ratio)	1.5 – 2.5
Fibrinogen (g/L)	2.0 – 4.5
D-Dimer (ng/mL)	<500
Thrombin Time (s)	10.3 -16.6
Factor II (IU/mL)	0.50 – 1.50
Factor V (IU/mL)	0.50 – 1.50
Factor VII (IU/mL)	0.50 – 1.50
Factor VIII (IU/mL)	0.50 – 1.50
Factor IX (IU/mL)	0.55 – 1.63
Factor X (IU/mL)	0.70 – 1.52
Factor XI (IU/mL)	0.67 – 1.27
Factor XII (IU/mL)	0.52 – 1.64
Factor XIII (IU/mL)	0.57 – 1.37
vWF Antigen (IU/mL)	Group O: 0.42 – 1.41 Groups A, B and AB: 0.66 – 1.76
vWF Activity (IU/mL)	Group O: 0.48 – 2.02 Groups A, B and AB: 0.61 – 2.40

Reference: Dacie and Lewis, Practical Haematology edition 10 (with local variations according to analyser performance).