East and North Hertfordshire NHS
NHS Trust

Pathology Handbook

Pathology Department
Level 3 Lister Hospital
Coreys Mill Lane, Stevenage
Hertfordshire SG1 4AB

Contents

1. Introduction

The Pathology service at East and North Hertfordshire NHS Trust (ENHT) offers a comprehensive range of pathology services, fully supported and led by consultant-grade staff across the Trust. The Pathology service comprises a Blood Sciences Department (Clinical Biochemistry, Haematology & Blood Transfusion) and a Cellular Pathology Department (Histology and Non-Gynae cytology). The Blood Sciences Laboratory offers a 24/7 service, and Cellular Pathology offer a weekday service.

This handbook describes the Pathology services offered at Lister Hospital, providing interpretative data where relevant, specimen requirements, and instructions for collecting specimens. Further information can be found within the pathology pages of the Trust's intranet (Knowledge Centre / Clinical Departments / Pathology).

Accreditation and quality assurance

The Pathology service operates within a quality management system which is regularly audited against national and international standards

- The United Kingdom Accreditation Service (UKAS) assess against ISO15189:2012 Medical laboratories - requirements for quality and competence. For an up-to-date list of accredited tests, click on this link: https://www.ukas.com/search-accredited-organisations/ and type in "East and North Hertfordshire". The Laboratories are listed under the single Laboratory number 8846.
- The Medicines and Healthcare Products Regulatory Agency assess against UK blood Safety and Quality Regulations
- The UK Human Tissue Authority licenses and inspects the mortuary. (licence number 12110)

All pathology tests are enrolled in national/international external quality assurance schemes, or similar local schemes where no national scheme exists. Results of internal quality assurance and external quality assessment exercises are formally reviewed by senior staff.

Pathology clinical staff are enrolled in proficiency testing schemes that assess the interpretation of pathology test results.

The Pathology service is also approved by the Institute of Biomedical Sciences for training of Biomedical Scientists.

Pathology services that are provided off-site by other organisations

Immunology and Microbiology services for the Trust are provided from Cambridge University Hospitals, Addenbrookes site. An overview of services and of local ENHT support for them is in this handbook. For more detailed information on these, visit https://gpconnect.addenbrookes.nhs.uk/article/3871/Pathology

Additionally, a number of specialist tests from all pathology disciplines are referred elsewhere from Lister for testing. In such cases patient identifiers and clinical details will be sent to the referral site to enable appropriate testing and interpretation. All referred tests are identified as such in the discipline's test listing, Appendix 1 gives further details.

Service agreement

All patient sample requests received in this Laboratory are considered as a financial agreement between the requesting organisation and the Pathology department, for a service and subsequent payment.

Protection of personal information

The laboratory follows the Trust's policies on information governance, for the protection of patient information

2. Key contacts

Dr Ashish Narula
Clinical Director
E: ashish.narula@nhs.net
T: 01438 286 326 – internal extension 6326

Laarni Calonzo
General Manager for Diagnostics and Haematology
E: l.calonzo@nhs.net
T: 01438 285 225 – internal extension 5225

Angela Woods
Consultant Clinical Biochemist and Pathology Laboratory Director
E: angelawoods@nhs.net
T: 01438 286 145 – internal extension 6145

Kate Barrett
Deputy Pathology Services Manager /Blood Sciences Manager
E: katebarrett@nhs.net
T: 01438 284 089 – internal extension 4998

Jane Tidman
Blood Transfusion Manager
E: j.tidman@nhs.net
T: 01438 2848 038 – internal extension 8038

Rachel Smith
Cellular Pathology Manager
E: r.smith96@nhs.net
T: 01438 285 840 – internal extension 5840

The Helpdesk – for queries relating to tests carried out at Cambridge University Hospitals
Open: Monday to Friday 08:00-18:00
E: pathp.servicedesk@nhs.net
T: 0333 103 2220

Phlebotomy Lister: 01438 285229
QEII: 01707 247544
HCH: 01992 823200
Blood Sciences Specimen Reception: 01438 285461
Biochemistry: 01438 284690
Haematology: 01438 284961
Blood Transfusion: 01438 285245
Cellular Pathology Laboratory: 01438 285198

3. Lister Pathology Opening Hours

Laboratory opening hours	
Core opening hours	
Monday to Friday	09:00 - 17:00
Out of hours service (Blood Sciences only)	17:00 - 09:00 Monday - Friday All day Saturday, Sunday and Public Holidays
Contacting the out of hours Biomedical Scientist	For all urgent out of hours work you must contact the relevant Biomedical Scientist: **Biochemistry**: Bleep 4690 or call ext 4690 **Haematology** Bleep 1005 or call ext 4961 **Blood Transfusion(BT)**: Bleep 1005 or call ext 5245 **Microbiology**: Contact Addenbrooke's Switchboard 0333 103 2220 **Histology/Cytology**: No service
Phlebotomy opening hours	
Monday to Friday	Lister: 08:00 - 17:30 Lister: Children under 10 walk in service between 8-16.00 QE2: 08:00 - 17:30 Fri 08.00-17.00 QE2: Children under 10 appt only HCH: 08:00 – 16.00
Saturday	Lister: 08.45 - 12:45 QE2: 08.00 - 12:00 HCH: No phlebotomy service No children under 10 years old seen at weekends at any site.

NB: See section 10 Phlebotomy for information on how to book.

4. Requesting pathology tests

The person making the request is responsible for ensuring the data on the request form is accurate, complete, and legible (whether hand-written or generated using ICE Order Communications System). Please give relevant clinical information to support all requests including relevant drug history, anatomical site of origin of specimen etc where relevant. Inadequately completed requests may lead to unnecessary delays, or rejection of samples.

The requester is also responsible for obtaining informed consent for the investigations; specific consent must be obtained if specimens may be used for purposes other than direct patient care (eg. for research purposes).

The requester must raise the alert regarding patients with the same or similar names at their location by use of the "SAME NAME" sticker. Where needed, the requester must also identify the High-Risk status of the patient.
If using addressograph labels for patient details on duplicate/triplicate paper forms, these must be applied to each copy as the forms are often separated in the laboratory.

ICE requesting should always be used if available. It is not yet available for Blood Transfusion or Cellular Pathology. To obtain user accounts and training for ICE, contact the ICE Team at enhtr.iceocs@nhs.net or phone Lister extension 4798.
For further information on the use of ICE, visit the Knowledge Centre>Pathology>ICE Order Comms.

Sample identification and acceptance criteria
Requests that do not meet the acceptance criteria will be rejected.

For NHS patients in general:
Correct use of ICE fulfils all the minimum data set requirements for request forms:

- NHS number (or CHI [Scotland] or Health and Care Number [Northern Ireland])
- Full name (surname **and** forename)
- Date of birth and/or hospital number
- Gender
- Location and destination for report
- Responsible Consultant/ GP/ Dentist
- Investigations required must be clearly indicated

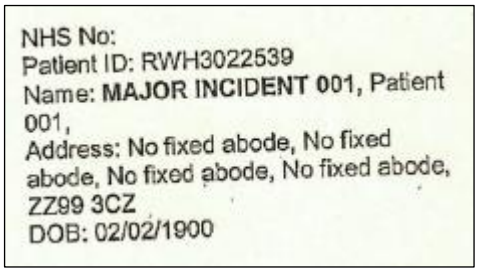
Also required in a majority of cases to enable appropriate analysis, interpretation and reporting:

- Name of the requester
- Contact number of the requester
- Relevant clinical information
- Other test-dependent required information (eg. time of last dose of certain drugs, anatomical site of sample, recent foreign travel where relevant etc)
- Date and time of sample (24 hour clock)
- Name/signature of person collecting the sample

For patients without NHS numbers, or those who require anonymisation:
The responsible Consultant is responsible for accepting and correctly assigning costs for non-NHS patients (eg. overseas visitors). The laboratory will accept samples without NHS number on this basis, as long as full name, date of birth and either our local hospital number or the first line of the address is supplied.

Patients of Genito-Urinary Medicine, staff requiring investigations by Health at Work, and (rarely) some participants in research trials may justifiably be anonymised. In these cases, NHS numbers are not supplied. The laboratory will accept these samples as long as a unique coded identifier is supplied. This takes the place of both the NHS number and the patient's full name on the sample and request form.

For unidentified patients associated with Major Incidents:
Due to the increased potential for confusion and error, all samples from unidentified patients during Major Incidents must be labelled with a unique identification number. These are included in the AE packs ready for major incident. Please see below;


NHS No:
Patient ID: RWH3022539
Name: **MAJOR INCIDENT 001**, Patient 001,
Address: No fixed abode, No fixed abode, No fixed abode, No fixed abode, ZZ99 3CZ
DOB: 02/02/1900

For Temporary Identification of the Unknown Patient follow the Trusts Policy CP274 where randomised names based on an amended version of the phonetic alphabet are used. An estimated date of birth is used and if the sex of the patient is unknown then they are set to female due to potential RhD-ve status and risk of sensitisation if RhD +ve blood is administered.

For Private patients and Category II requests:
All Private and Category II requests must be declared as such on the request form.
If no NHS number or other unique coded identifier is provided, the first line of the patient's address must be supplied.
The requester is responsible for ensuring that the patient has already signed an "agreement to pay" form. If a request is suspected to be non-NHS there may be a delay in testing until payment is secured.
Specimens submitted from private patients are investigated by the same protocols as NHS patients.
Private Patients attending phlebotomy with requests from other hospitals will be asked to sign an 'Agreement to pay' form before being bled.
Please contact the Trust's Private Patients Team if you require further information, such as prices.

Request for new Pathology test

If there is a test that is not listed in this Handbook or available on ICE please use the link below to access a request form. Send the completed form to ashish.narula@nhs.net this will be discussed for approval at the Pathology User Group meeting.

Request for new test- PUG (scroll to bottom of page and click)

5. Collecting pathology specimens

For conscious patients, the person obtaining a specimen must positively identify them by asking their surname, first name and date of birth, and checking that these match the request form. For inpatients, these details should be further checked with those on the patient's wristband (which will also have NHS and hospital numbers). For specimen collection from outpatient areas where patients do not have wristbands, the patients should be asked to also recite the first line of their address for checking against the request form. If the patient is unconscious, a senior member of the ward staff should confirm the patient's details in addition to the wristband check.

The same person who collected the specimen must themselves label the container correctly and fully in the presence of the patient immediately after collection. Do not hand samples to a colleague for labelling. Do not pre-label blood tubes.

Minimum data set requirements for specimen containers:

- NHS number (or CHI [Scotland] or Health and Care Number [Northern Ireland])
- Full name (surname and forename)
- Date of birth and/or hospital number
- Specimens for cross-matching must always be signed by the person obtaining the specimen
- When several samples from the same patient are to be collected they must all have the correct corresponding sample label from the appropriate request form. Ie F barcode number for fluoride oxalate sample for Gluc. The ICE request form gives this information at the bottom.

As well as using the above identity information, all specimen labels should include the following:

- date and time of specimen collection
- initials of person collecting the sample

There is zero tolerance for samples and request forms for Blood Transfusion that are not labelled with the NHS number (where a patient has one). Samples and request forms without this information will not be processed unless the patient requires urgent blood product support.

Where no NHS number is available, see the requirements listed above under "Requesting pathology tests".

Addressograph or ICE labels may be used for the majority of samples but **must not** be used for blood transfusion samples.

Unlabelled or mislabelled specimens cannot be accepted by the laboratory for testing. Specimens that cannot be repeated (eg. CSF, biopsies etc) **may** be accepted after full discussion with a senior member of laboratory staff, and logging of an Enhance incident by the person responsible.

Tips for obtaining valid results and to avoid sample rejection

The laboratory endeavours to provide the best possible service but the quality of the results ultimately depends on the quality of the sample submitted for testing

- Avoid prolonged venous stasis when collecting blood.
- Use the correct order of draw - consult the tube guide for order of drawing samples.
- Avoid contamination of sample with iv fluids (do not use drip arm).
- Do not mix blood from one specimen container with another.
- Ensure that urine collections are timed correctly and kept cool.
- Send samples to the laboratory or specimen collection points without delay.
- Be aware of sample fill levels especially for coagulation samples, ESR and Quantiferon-TB. Always fill to/ within the black fill mark on the side of the tubes to avoid sample rejection.
- **DO NOT** send blood gas samples via the chute.
- Always check sample tube expiry dates. Out of date tubes will be rejected.
- Ensure all samples sent are securely sealed, leaking samples will not be processed.

6. Transport of specimens to the Pathology Department

All specimens must be transported inside a fully sealed polythene specimen bag. Place only one patient's form and its associated specimens into one bag. Place the specimen in the welted pouch and seal it, place the form into the adjoining unwelted pouch (for blood transfusion samples the bag is integral to the request form). Do not place the form in the welted pouch with the specimen.

Specimens should be sent to the laboratory by either the pneumatic chute or by a hospital porter. High-risk samples, blood gas samples requiring PO_2 and PCO_2 measurement, blood culture samples, Microbiology swabs, and Cellular Pathology samples must not be sent through the pneumatic tube system.

Blood gas syringes must be sealed with the caps supplied. **Never send syringes with needles still attached**. They must be transported to the laboratory as soon as possible and within 20 minutes. Syringes received via the chute can only be tested for pH, electrolytes, glucose, lactate.

Specimens from Queen Elizabeth II and Hertford County Hospitals are collected in Phlebotomy clinics then transported to Lister Pathology departments. Specimens referred for testing elsewhere may be transported in different ways, including CitySprint, Royal Mail, Hays DX, NHSBT, Trust drivers.

Urgent Samples

Samples from agreed priority areas (eg. ED) or clinically urgent samples from other areas should be placed in a red welted pouch and sent immediately to the lab for processing.
Urgent samples from non-priority areas of the hospital must be heralded to the laboratory by phoning 5461**.**

General Practitioner practices

The local CCG work is contracted to Cambridge University Hospitals. Samples are collected from Surgeries and other phlebotomy locations by Cambridge University Hospitals logistic services and delivered to Lister or Addenbrookes as appropriate. Individual welted specimen bags are first packed into **either** a large colourless bag or a large green bag as outlined in the table below. Colourless bags are directed to Addenbrookes and the green bags to Lister.

Test Requests	**Bag colour**	**Location of analysis**
GP Requests only. Haematology/Biochemistry/Microbiology/ Immunology	Colourless Bag	CUH
Hospital Consultant Requests only at Lister/QE2/Hertford Outpatient areas, for Haematology/Biochemistry/Microbiology/ Immunology	**Green Bag**	**ENH**
Urgent Haematology/Biochemistry/Microbiology/ Immunology samples in Red Bags	Colourless Bag	CUH
Cervical Screening	Purple Bags for NNH	NNH (sent to CUH for sending on to NNH)
ALL Antenatal Tests including grouping	**Green Bag**	**ENH**
Blood Transfusion Requests	**Green Bag**	**ENH**
Thyroglobulin, Trace metals	**Green Bag**	**ENH**
Histopathology, non gynae cytology outpatients, (All Consultant requests)	**Green Bag**	**ENH**
INR	**Green Bag**	**ENH**

7. High risk specimens

Separate procedures are used in the laboratory for the safe handling and examination of samples from patients known or suspected to have infections caused by high risk (hazard group 3 & 4 pathogens - see below) that pose a risk to laboratory workers and others if handled incorrectly**.** Under the Health & Safety at Work etc Act 1974 it is the responsibility of the person making pathology requests to ensure that the laboratory is appropriately informed of the potential dangers of handling any high risk samples.

Requests made via ICE should be flagged by ticking the high risk box in the order entry screen on ICE. Paper/ICE requests must give sufficient clinical information to enable experienced laboratory staff to know what special precautions are necessary, including relevant foreign travel history.

In the interests of confidentiality 'High Risk' labels should be placed only on the sample.

Hazard group 3 & 4 pathogens include the following:	Hazard Group
Alpha viruses	**3**
Blastomyces	**3**
Brucella sp.	**3**
Borna Virus	**3**
Claophialophora	**3**
Coccidioides	**3**
Covid-19	**3**
Duvenhage	**3**
Ebola viruses	**4**
E.coli O-157	**3**
Flaviviruses	**3**
Hanta viruses	**3**
Histoplasma	**3**
HIV 1 and 2	**3**
Hepatitis B virus	**3**
Hepatitis C virus	**3**
Hepatitis D virus	**3**
Hepatitis E virus	**3**
Hepatitis G virus	**3**
Herpesvirus simiae	**4**
HTLV 1 and 2	**3**
Leishmania	**3**
Monkeypox	**3**
Mycobacterium sp	**3**
Naegleria	**3**
Nipah	**4**
Paracoccidioides	**3**
Penicillium marneffei	**3**
Phleboviruses	**3**
Piry	**3**
Plasmodium falciparum	**3**
Rickettsia sp	**3**
Salmonella paratyphi	**3**
Salmonella typhi	**3**
Simian Immunodeficiency virus (SIV)	**3**
Trypanosoma	**3**
Variola (minor & major)	**4**

and the causative agents of:

Anthrax	**3**
Bovine spongiform Encephalitis (BSE)	**3**
Brucellosis	**3**
Creutzfeldt-Jakob disease (CJD)	**3**
Dengue	**3**
Diphtheria	**3**
Dog tapeworm	**3**
Dysentry	**3**
Fatal familial insomnia	**3**
Glanders	**3**
Hendra	**4**
Kuru	**3**
Mellioidosis	**3**
Paratyphoid	**3**
Plague	**3**
Pork tape worm	**3**
Q-fever	**3**
Rabies	**3**
SARS	**4**
Smallpox	**4**
Tick borne encephalitis	**3/4**
Transmissible spongiform encephalopathies (TSE)	**3**
Tularaemia	**3**
Typhoid	**3**
Variant Creutzfeldt-Jakob disease (vCJD)	**3**
Viral Haemorrhagic Fever (Lassa Fever, Ebola Fever and Marburg Disease)	**4**
Yellow Fever	**3**

In cases indicated in red do **NOT** send specimens until the case has been discussed with a Consultant Microbiologist. **For a full list see www.hse.gov.uk – ACDP Approved list of biological agents**

Covid-19

This is a Hazard Group 3 organism. There is evidence that blood contains very low viral load, hence blood samples may be sent to the laboratory without a High Risk label and sent using the pneumatic chute. Respiratory samples including viral swabs and nasopharyngeal aspirates or sputums have high viral load hence are high risk and must not be sent via the chute.

8. Reporting of results

Access to completed pathology results is available throughout the Trust sites (e.g. wards and departments), CCG sites (e.g. health centres, GP surgeries), Hertfordshire Partnership units, and to other customers via ICE OCS (order communications system). If you are accessing results through East & North Hertfordshire NHS Trust ICE OCS then assume that all tests are processed at Lister unless otherwise stated.

Critical results (for details see individual discipline sections below) are telephoned urgently to the requesting clinician, ward or clinical team. Please ensure that correct information is on all requests otherwise delay is likely. The receiving clinician(who must be a qualified member of nursing, midwifery or medical staff; or a Clinical Support Worker who has undertaken specific training) should document the results within the patients notes at the earliest opportunity and bring it to the attention of a senior member of staff where necessary. In line with the Trust's policy 'Acting on Diagnostic Investigations' it is the requesting clinician's responsibility to review all pathology results from tests requested and to act on these results appropriately.

Requesting further tests on samples already in the laboratory (Add-tests)

The laboratory will respond to add-test requests as quickly as possible, but this process is inefficient and slow in comparison with the usual process of receiving samples with the request, so we ask requesters to please try to avoid the need for these as far as possible. Although the sample may already be received in the laboratory it may not be possible to retrieve it from our automated systems for a considerable length of time. If the request is very urgent, it may be quicker to re-bleed the patient and send a fresh specimen.

If an add-test is required, please make a new ICE request for the additional test(s), citing in the "clinical details" section the words "add test" and the laboratory number of the sample to which you need to add further tests:

- To obtain the laboratory number for a sample, look in "view requests by patient", click on "view order" and it is the number identified as "order accession number" and follows the format of YYL123456 where YY is the year.
- To obtain the laboratory number for a sample that has already been reported, it is also possible to obtain it by looking in "view patient reports", where it is the number appearing in the "sample number" column on the screen.

Not all add-test requests can be accommodated, due to sample stability or storage issues.

In the event of major delays to the system the Pathology department will notify the matron/bed manager on call for the hospital. In more severe circumstances or when planned downtime is known of in advance notification will be made via communication via email with the Trust.

Routinely if any examination is delayed that could compromise patient care, the requestor will be notified.

9. Pathology Information

Pathology supplies

Specimen containers and associated items are supplied from the laboratory. A Pathology Stock Ordering Form (available from Specimen Reception) must be completed and returned to Pathology at least half a day in advance of when the goods are required. Stock Ordering Forms received in the morning will be ready for collection later that afternoon, those received in the afternoon will be ready for collection the following morning except at weekends. Supplies are only available to be collected during normal weekday working hours.

Clinical areas are responsible for ensuring that their stock is adequately controlled to ensure:

- Reasonable level of stock only in each area with no excessive build-up
- Sufficient level of stock to meet the area's needs without requiring emergency issue of stock from Pathology
- Rotation of stock to prevent wastage of time-expired tubes etc. Excess or expired stack should be returned to Pathology accompanied by Pathology Ward Stock Return Form.

In the event of an emergency requiring an out-of-stock item, then this single item can be obtained from Pathology out of hours by phoning either 4961 or 4295.

Point of care testing

The laboratory is responsible for providing advice and support for Point-of-Care testing (POCT) (e.g. urine testing, blood gas, blood glucose etc.). The current East and North Hertfordshire NHS Trust Policy on POCT must be followed. Ward-based tests may only be performed by authorised users after adequate training. Users who perform tests as part of their clinical practice are advised to contact the laboratory with any queries about maintenance, quality control, operation problems or health and safety aspects. The laboratory point of care co-ordinators lead on all training, audits and support issues.

Before purchase of any extra-Laboratory instruments, the Trust POCT Committee must be consulted about suitability. Installation may only take place after approval by the POCT committee and relevant Pathology Consultant.

Please note that there are MHRA Hazard Notices regarding the use of Ward-based instruments, of which users must be aware.

Other services and complaints

Pathology can provide a range of services and information to wards, departments and GP practices. If you wish to discuss any service developments or require information relating to or derived from the pathology service then please direct your enquiry as follows:

To discuss service developments – please speak to the Pathology Service Manager, See contact details in section 2.

To make a complaint email: complaintsadmin.enh-tr@nhs.net

To log an incident :- Trust users report on the Trust Enhance system,

GP's go through the ENHT GP Liaison team – Gpliaison.enh-tr@nhs.net

10. Phlebotomy

The Phlebotomy department is part of ENHT and consists of three phlebotomy departments across sites at Lister Hospital Stevenage, The New QEII Welwyn Garden City and Hertford County Hospital.
The phlebotomy service supports GP surgeries in the area and also offers a local domiciliary service.
Responsibility for ensuring consent for pathology tests lies with the requester. Consent to blood tests is assumed when a patient attends the phlebotomy department with a request. For some specialist tests and research, separate consent with the requesting clinician will be sought.
Please note that remnant samples (after all requested tests have been completed) may be anonymised and used for service evaluation or quality assurance purposes.

Key contacts

Phlebotomy manager

Elaine Stokes
E: elaine.stokes@nhs.net
T: 01438 285229

GP patient Blood tests and online booking

Blood test appointments, requested by GPs, should now be booked online for the following hospitals: Hertford County Hospital, Lister Hospital and New QEII. This is to help maximise the number of tests we can offer to patients, minimise queues.

Our current walk-in service will remain in place for those attending outpatient appointments, patients with an urgent GP blood request and those with a request for specialised tests, for example where a blood test is required on a certain day of the menstrual cycle.

Adults and children (11 years and over)

You should book your appointment using the links below:

- Lister Hospital
- New QEII Hospital
- Hertford County Hospital

Children (10 years and under)

If the patient is under 10 years old, please book using the following link:

- Lister Hospital (Children)

•There are limited appointments for children under 10 available at Hertford County Hospital and New QEII Hospital. Please call the Phlebotomy team below to book.

Appointment booking lines 01438 284044/ 01438 284330

Emla cream (a topical numbing cream) can be obtained by prescription from the GP or bought over the counter at any pharmacy. It needs to be applied 1 hour before attending the department. This may be useful for use in children.
Numbing spray is also available for children and needle phobic adults. This is applied immediately prior to venepuncture.

Attending your appointment:

When you arrive for your appointment, please go to the phlebotomy reception area at the hospital and provide your name and your appointment time.

Please arrive promptly and ideally no earlier than five minutes beforehand to help ensure social distancing.

What if I am unable to book online?

If you are unable to book online, please call the phlebotomy team on 01438 284044 / 01438 284330 Monday-Friday between 9-5pm. The team will be happy to book your appointment for you.

Please note: In order to book your appointment, you will need your:

•Name •Date of birth •Postcode •Mobile phone number
•NHS number – you can easily find out your NHS number here on the NHS website

Please be advised these lines can get extremely busy so if you have someone to help you access the online booking system this may be quicker.

Community-based sessions – appointment only

Appointments are needed to attend these phlebotomy sessions:

Baldock
Park Drive Health Centre (by appointment only via Baldock and Letchworth GP surgeries)
•Tuesday, 8.30am to 12noon
•Wednesday, 1.30pm to 4.30pm
•Thursday, 8.30am to 12noon

Hitchin
Bedford Road Health Centre (by appointment only and then through just the following Hitchin GP surgeries: Marshall House, Orford Lodge, Portmill and Regal Chambers)
•Tuesday , 8am to 4.30pm

Hoddesdon
Hoddesdon Health Centre (by appointment only)
•Monday to Friday, 8.30am to 2pm (excluding bank holidays)

Stevenage
Danestrete Clinic (by appointment only – appointments are made normally directly by nurses with patients attending anti-coagulation clinics)
•Mondays and Wednesdays only, 8.30am to 11.45am (excluding bank holidays)

Waltham Cross
Stanhope Road Health Centre (by appointment only, but through the health centre itself – 01992 818500)
•Monday to Friday , 8.30am to 12noon (excluding bank holidays)

Ware
Bowling Road Health Centre (by appointment only)
•Monday, 1.30pm to 3.45pm (excluding bank holidays)
•Wednesday, 8.30pm to 12noon
•Friday, 8.30am to 12noon (excluding bank holidays)

Fasting blood test requirements

•Fasting glucose – at least 8 hours fasting
•Glucose tolerance test (GTT) – 8-14 hrs fasting
•Fasting lipids and triglycerides – at least 12-14 hrs fasting
•NB: Fasting means no food or drink apart from water.

24 hour urine samples

If you have been asked to complete a 24 hour urine collection the containers can be picked up from the Phlebotomy receptions at QE2, Hertford and Lister Hospitals. Information leaflets are available for advice on how to fill.

Some tests require a container that is issued with a small amount of acid to preserve the sample. Do not discard; this must remain in the bottle. Completed samples should be returned to any phlebotomy reception.

Stay hydrated

It is advisable to be well hydrated before a blood test. Please remember to drink water before getting your blood taken.

Private patients and Patients with request forms from other hospitals

Whilst phlebotomy may agree to take your blood it is ideal to be bled at the requesting hospital or trust where your test request has been made. This ensures results get back to the requester easily, analytical methods are comparable to previous reports and delays reporting are minimised.

Private patients other than ENHT, will be asked to fill in a private billing form that

In patient blood tests

All ICE requests for ward rounds need to be made and on the ICE system by 7am on the day of collection.

Phlebotomists start bleeding from 6am to 11am (7am – 11 at weekends) however priority wards are visited first.
Please be aware that not all tests are suitable to be collected by phlebotomists on ward rounds. These include but are not limited to

- blood cultures
- timed drug/ therapeutic monitoring samples
- Dynamic function tests
- Time sensitive tests ie Ammonia, ACTH, Insulin etc.

Please DO NOT request these tests for ward rounds.

Domiciliary blood tests

This service is highly oversubscribed. It is only offered to patients who are completely housebound or are severely unwell.
Patients meet the criteria for a domiciliary visit if they are;
· Housebound · On oxygen · In a care/nursing home
· Visited by their GP at home (this is at the discretion of the GP)
· Extremely unwell patients (this is at the discretion of the requesting clinician)

Requests for this service on patients must be emailed to:

Listerdomiciliary.enh-tr@nhs.net , Hertforddomiciliary.enh-tr@nhs.net, QE2domiciliary.enh-tr@nhs.net

Patient Results

Please phone your GP directly for your results.

Please do not phone the laboratory or Phlebotomy, as staff are not permitted to issue results.

11. Clinical biochemistry

Clinical Biochemistry is part of Blood Sciences department at ENHT, this information is related to all acute work performed with ENHT

Opening hours
Monday to Friday: 09:00-17:00
At all other times contact the Biomedical Scientist on call for urgent work only.
Bleep 4690
General queries: 01438 284690

Key contacts
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Results

Pathology results are available on Sunquest ICE system, if results are not available please contact the laboratory on Ext 5461

Limitations of biochemical test results

Please be aware that biochemistry tests are generally robust but all are vulnerable to occasional assay interference due to uncommon patient-specific factors. Clinicians should always correlate results with the clinical picture. If a patient's results do not match their clinical condition, please discuss with one of the laboratory consultants so that further testing can be arranged if needed.

Special note regarding immunoassay tests

All immunoassay tests (troponin, hormones, haematinics, tumour markers etc) have the potential to produce erroneous results in patients with unusual antibodies.
In recent years, dietary supplements containing high-dose biotin (up to 650 times the recommended daily intake) have been marketed for supposed skin, hair and nail benefits. Even higher doses of biotin are also starting to be used in progressive multiple sclerosis. High dose supplementation (≥ 5mg/day) can interfere with all immunoassay tests that use biotin/streptavidin in their design, this includes all those performed in the Lister Hospital Laboratory. The expected pattern of results with high-dose biotin interference is:

- falsely high thyroid hormones, steroid hormones, digoxin
- falsely low peptide and protein hormones (TSH, troponin, PSA, PTH etc)

Severe interference from biotin can lead to biochemically thyrotoxic results that do not match the clinical picture.
There is lack of certainty about the time required to clear high-dose biotin from the blood, however between 1 and 4 days abstinence is probably advisable, depending on the magnitude of the dose and renal function.

Tests and specimens

Results are reported with reference ranges and/or an interpretative comment. Advice on appropriate requesting and interpretation of results is available at all times from the consultant staff by telephone, mobile telephone. Out of core hours the consultant on-call should be accessed through switchboard.

Add on requests will only be accepted for tests performed at Lister Hospital, these must be made within 24hours and must be accompanied by a request form.

Dynamic function tests – please discuss with the consultant chemical pathologist or the consultant biochemist.

Critical results - **these apply to acute work only, for GP requests refer to** https://gpconnect.addenbrookes.nhs.uk/article/3871/Pathology

Results outside the limits below will be telephoned urgently to the requesting clinician.

Test	Units	Critical Low	Critical High
Acute kidney injury (AKI) warning stage			3
Albumin	g/L	<15	
ALT (paeds) on first occurrence	U/L		>500
Amylase	U/L		500
Ammonia	µmol/L		100
Bilirubin (newborns only)	µmol/L		250
Calcium (adjusted)	mmol/L	1.8	3.5
Carbamazepine	mg/L		25
Cortisol (children <18yrs)	nmo/L	<50	
Creatine kinase (CK)	U/L		5000
Creatinine	µmol/L		500
Digoxin	µg/L		2.5
FT4	pmol/L	6	40
PLEASE NOTE- When reporting critical FT4, please report the TSH result as well.			

Gentamicin pre-dose (adults)	mg/L		1.0
Gentamicin pre-dose (newborns)	mg/L		2.0
Gentamicin post-dose	mg/L		10.0
Glucose (random or fasting)	mmol/L	≤2.5	≥15 (<16yr) ≥25 (>16yr)
Iron	µmol/L		55
Lithium	mmol/L		1.0
Magnesium	mmol/L	0.40	2.00
Paracetamol	mg/L		100
Phenytoin	mg/L		25
Phosphate	mmol/L	0.40	3.00
Potassium	mmol/L	2.5	6.5
Salicylate	mg/L		350
Sodium	mmol/L	≤130 (<16yr) ≤120 (>16yr)	155
Theophylline	mg/L		25
Triglycerides	mmol/L		20.0
Urate	µmol/L		1000
Urea	mmol/L		30.0
Vancomycin	mg/L		25

Biochemistry blood tests – if the assay required is **NOT** listed then please contact the department directly. All results are reported with reference ranges and/or an interpretative comment. Advice on appropriate requesting and interpretation of results is available at all times from the Chemical Pathologists and Clinical Biochemists.

Sample volumes: Most routine tests can be performed on 5ml clotted (BROWN) serum sample, unless otherwise stated below (For paediatric samples a minimum of 1ml of blood is required).

Indicative turnround times are given for non-urgent situations. It may be possible to expedite results by discussing the clinical situation with the laboratory consultant staff.
If a required test is not listed here, please discuss with the laboratory consultant staff.

***For full referral address refer to Appendix 1**

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
5-hydroxyindole acetic acid (5-HIAA)	Serum (brown)	<140nmol/L	MWY	<2 weeks	Collect sample after overnight fast, to avoid false positives from serotonin-rich foods. Do not eat walnuts in the 24h period prior to the blood collection.
This serum test replaces 24 hour urine 5-HIAA for the diagnosis of carcinoid syndrome, in which it is usually					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
strikingly elevated. It is also used for monitoring neuroendocrine tumours (NETs) that have been shown to secrete 5-HIAA. For non-functional NETs consider using chromogranin A instead. False positive results may occur if the diet contains serotonin-rich foods (eg. banana, tomato, walnut, aubergine, avocado, pineapple, kiwi fruit). An overnight fast is sufficient to prevent this; however walnuts should not be consumed during the previous day as they are particularly rich in serotonin. 5-HIAA is eliminated by the kidneys, hence serum levels increase with decreasing GFR, and urine levels decrease. If GFR is below 60mL/min, it is likely that serum 5-HIAA will be elevated in otherwise normal individuals with no carcinoid tumour or NET.					
Acylcarnitines	4 dried blood spots (Guthrie card)	Interpretation with report	GOS	<2 weeks	Clearly write “acyl carnitines” on the card. Allow to air-dry, then place in glassine sleeve and send to Laboratory. Do not post to Newborn Screening Laboratory.
The acylcarnitine test (bloodspot) is a core metabolic test useful in the investigation of fatty acid oxidation defects and classical organic acidurias. Investigations should be performed, where possible, when the patient is symptomatic.					
ACTH - Adrenocorticotrophin	EDTA (Red)	Interpretation with report	CUH	2 weeks	Send to lab promptly for immediate freezing of plasma. Take blood for cortisol also.
Adrenaline [part of Plasma catecholamines]	Lithium Heparin [Orange]	This test is not routinely offered. It is not a sensitive test for phaeochromocytoma – send plasma metadrenalines instead.			
Albumin	Serum (Brown)	35-50g/L		<1 day	
Alcohol (ethanol)	Fluoride EDTA (Yellow)			<1 day	Clinical samples only. Medico-legal work NOT accepted
Aldosterone	EDTA (red)	See comments	ADI	2 weeks	Renin sample should be taken at same time. 90–405pmol/L (adult recumbent overnight) 90–720 pmol/L (random or upright)
Aldosterone test is used along with renin in the investigation of suspected primary hyperaldosteronism (Conn’s syndrome) in patients with moderate/severe hypertension that is of early onset, drug-resistant, or associated with hypokalaemia or adrenal incidentaloma. See ARR below.					
Aldosterone /renin ratio (ARR)	EDTA (red)	<91 pmol/mU			
ARR is the first-line investigation for suspected primary hyperaldosteronism. Before doing this test, try to correct hypokalaemia and encourage liberal sodium intake. If possible, withdraw the following drugs and products for at least 4 weeks as these have a big effect on ARR: spironolactone, amiloride, eplerenon, triamterene, potassium-wasting diuretics, liquorice. Many other drugs have lesser but predictable effects on ARR and drug history should always be reviewed when interpreting results. Blood samples should be collected in the morning after the patient has been up for at least 2 hours and seated for 5-15 minutes. High aldosterone-renin ratio is not diagnostic and should be further investigated.					
ALP (alkaline phosphatase)	Serum (Brown)	30-130 IU/L		<1 day	Age- and sex-related reference ranges are on paediatric reports.
As of 4/2/2021, results for alkaline phosphatase (ALP) are increased by about 7% in order to improve					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
alignment to international standards. Reference ranges remain unchanged as these are defined nationally for this test. We do not expect this small change to have any significant impact on clinical care.					
ALP isoenzymes	Serum (Brown)	Interpretation with report	EKE	4 weeks	Rarely needed. Only done if ALP is markedly elevated
ALP Bone Specific [bone ALP]	Serum (Brown)	Interpretation with report	CHX	3 weeks	
Alpha 1 antitrypsin	Serum (Brown)	1.1-2.1g/L 1w (0.9-2.2) 6m (0.8-1.8) 1yr (1.1-2.0) 5yr (1.1-2.2) 10yr (1.4-2.3) 15yr (1.2-2.0) (1.1-2.1)	CUH	<1 week	Ranges vary for children
Alpha 1 antitrypsin phenotype	serum (Brown)	Interpretation with report	ADI	2 – 3 weeks	
AFP – alpha fetoprotein in pregnancy		Interpretation with report			**Arranged via maternity services**
AFP – alpha fetoprotein (tumour marker)	Serum (Brown)	0-9 kU/L	CUH	<3 days	
Alpha subunit of pituitary hormones	Serum (Brown)	Interpretation with report	QEH	<2 weeks	By prior arrangement with consultant only
ALT (alanine amino-transferase)	Serum (Brown)	7-40 IU/L		<1 day	
Aluminium	Trace metal (Orange TRACE)	0-0.3µmol/L	CHX	<2 weeks	
Amino acids	Lithium heparin (Orange)	Interpretation with report	GOS	< 2 weeks	Send to lab promptly for immediate freezing of plasma.
Amino acids (plasma) are a core metabolic test useful for the investigation of urea cycle defects and some organic acidurias. Investigations should be performed, where possible, when the patient is symptomatic.					
Amiodarone	Serum without gel [White]	0.5-2.0mg/L	CAR	1 week	By prior arrangement with consultant only
Amisulpride	EDTA (Red)	A target range of 100-400 µg/L plasma amisulpride (pre-dose) has been suggested at therapeutically	KIT	2 weeks	By prior arrangement with consultant only

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
		effective doses from steady-state pharmacokinetic studies.			
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses					
Amitriptyline	EDTA (red)	Interpretation with report	CAR	1 week	By prior arrangement with consultant only
Ammonia	EDTA (Red)	16-60umol/L 4w 0-100 16w 0-50 M 16-60 F 11-51		<1 day	Contact laboratory. Send to lab IMMEDIATELY Recommended within 15mins
Amylase	serum (Brown)	28-100U/L Up to 4 wks old:12 – 21 U/L Up to 11 Mths old: 12 – 92 U/L Up to 15 Yrs old: 12 –118U/L >15 Years old: 30 – 118 U/L		<1 day	
Androstenedione	Serum (Brown)	<9 nmol/L	CHX	<2 weeks	Ranges vary with gender and maturity
ACE (angiotensin converting enzyme)	Serum (Brown)		CUH	<1 day	
Anti-Mullerian hormone (AMH)	Serum (brown)	See report	MRI	<1 week	Age- and sex-related reference ranges are on paediatric reports.
AMH test is used in the assessment of ovarian reserve in women with endometriosis, or being assessed for assisted reproduction. It may also be used in the assessment of disorders of sexual development in children. Results for adult females include interpretation in terms of ovarian reserve status, or risk of ovarian hyperstimulation in assisted reproduction. This test may only be requested by or on behalf of a specialist Consultant such as Consultant Obstetrician (Fertility Specialist) or Consultant Paediatrician.					
Aquaporin 4 antibodies	Serum (Brown)		ION	<2 weeks	
Aripiprazole	EDTA (Red)		KIT	2 weeks	By prior arrangement with consultant only
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses					

<table>
<tr><th>Test</th><th>Sample</th><th>Adult Reference range</th><th>*If referred site code</th><th>Turnaround time</th><th>Comments</th></tr>
<tr><td>Arsenic [blood]</td><td>Whole blood (EDTA trace element tube (royal blue), EDTA (purple) or Heparin (green top)</td><td>See report</td><td>CHX</td><td>2 weeks</td><td>Dietary restrictions required for 5 days prior to sampling. Prior discussion with Biochemistry consultant is advised.</td></tr>
<tr><td colspan="6">Arsenic test is used investigate patients with signs/symptoms of possible arsenic toxicity. The test does not differentiate between toxic inorganic arsenic and non-toxic organic arsenic derived from food. In the UK population, most arsenic is absorbed from food and is not a risk to health.
Patient must abstain from eating fish, shellfish, seaweed, chicken, rice products, and nutritional supplements for five days before the sample is collected.
There is PHE guidance at https://www.gov.uk/government/publications/arsenic-properties-incident-management-and-toxicology/arsenic-general-information</td></tr>
<tr><td>AST (aspartate aminotransferase)</td><td>Serum (Brown)</td><td>F 0-32 U/L
M 0-40 U/L</td><td></td><td></td><td></td></tr>
<tr><td>B2M (beta-2 microglobulin)</td><td>serum (Brown)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Beta carotene</td><td>Serum (Brown) or Plasma [lithium heparin, Orange]</td><td></td><td>STH</td><td></td><td>Send to lab promptly for immediate freezing of plasma</td></tr>
<tr><td>Bicarbonate (HCO3)</td><td>Serum (Brown)</td><td>22-29mmol/L</td><td></td><td><1 day</td><td></td></tr>
<tr><td>Bile acids</td><td>serum (Brown)</td><td></td><td></td><td><1 day</td><td></td></tr>
<tr><td>Bilirubin (total)</td><td>serum (Brown)</td><td><21umol/L
See Comments section for Age related refs</td><td></td><td><1 day</td><td><table><tr><th>Age</th><th>Lower Limit</th><th>Upper Limit</th></tr><tr><td>0 to < 15 days</td><td>0</td><td>250</td></tr><tr><td>15 days to < 1 year</td><td>0</td><td>10</td></tr><tr><td>1 to < 9 years</td><td>0</td><td>5</td></tr><tr><td>9 to < 12 years</td><td>0</td><td>8</td></tr><tr><td>12 to < 15 years</td><td>0</td><td>10</td></tr><tr><td>15 to < 19 years</td><td>0</td><td>12</td></tr><tr><td>≥ 19 years (Roche)</td><td>0</td><td>21</td></tr></table></td></tr>
<tr><td>Bilirubin (conjugated)</td><td>Serum (Brown)</td><td>0-5umol/L</td><td></td><td><1 day</td><td></td></tr>
<tr><td>Blood gases (arterial blood)</td><td>Heparinised</td><td>pH 7.35-7.45
pCO2 4.7-6.0</td><td></td><td><1 hour</td><td>Seal with cap provided. Do not send via pneumatic chute.</td></tr>
</table>

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
	syringe	kPa pO2 10.7-14.6 kPa			Label clearly.
BNP	Serum (Brown)	See report		<1 day	
Bone profile	Serum (Brown)			<1 day	See calcium, phosphatase, albumin & ALP
C-peptide (of insulin)	Serum (Brown)	Interpretation with report	RSC / GOS	1 week	Send to lab promptly for immediate freezing of serum. Assayed only if corresponding glucose <2.5 mmol/l RSC is for adult samples GOS for paed samples
CRP (C reactive protein)	Serum (Brown)	<5mg/L		<1 day	
CA125	Serum (Brown)	0-23 IU/L	CUH	<3 days	
CA153	Serum (Brown)	0-35 IU/l	CUH	<3 days	Not recommended for diagnosis
CA199	serum (Brown)	0-35 IU/L	CUH	<3 days	Not recommended for diagnosis
Caeruloplasmin	serum (Brown)	0.2-0.4g/L	CHX	<2 weeks	
Calcitonin	serum (Brown)	Male <11.8ng/L Female <4.8ng/L	HAM	<2 weeks	Send to lab promptly for immediate freezing of serum. Fasting sample preferred.
Adjusted Calcium	serum (Brown)	2.2-2.6 mmol/L Age related ranges in comments		<1 day	Up to 4 weeks old = 2.0 – 2.7 mmol/L Up to 15 years old = 2.2 – 2.7 mmol/L
Carbamazepine	Serum (Brown)	4-12ug/L		<3 days	Collect trough sample just before oral dose
Carboxyhaemoglobin	Heparinised syringe	Non smoker 0.5-1.5% Smoker upto9%		<1 day	Seal with cap provided. Do not send via pneumatic chute. Label sample.
Catecholamines [PLASMA]	Lithium heparin [Orange]	This test is not routinely offered. It is not a sensitive test for phaeochromocytoma – send for plasma metadrenalines instead.			
CEA (carcino embryonic antigen)	Serum (Brown)		CUH	<3 days	Higher values in smokers
Chloride	Serum (Brown)	95-108 mmol/L		<1 day	

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
Cholinesterase (acetyl)	EDTA (Red)	Interpretation with report	AML	2 -3 weeks	For monitoring organophosphate exposure
Cholinesterase (pseudo)	EDTA (Red)	Interpretation with report	AML	2 – 3 weeks	For assessment of succinylcholine sensitivity
Clomipramine	EDTA (red)	Interpretation with report	CAR	1 week	By prior arrangement with consultant only
Chromium	Trace metal (Orange TRACE)	Interpretation with report	SAN	1 week	For use of Orthopaedic teams monitoring Metal-on-Metal hip replacements only. Patients consulting GPs with concerns should be referred back to the responsible surgeon.
Chromogranin A & B [Part of gut hormone profile]	EDTA [Red]	Interpretation with report	CHX	4 weeks	Send to lab promptly for immediate freezing of plasma.
Citalopram	EDTA (red)	Interpretation with report	CAR	1 week	
Copper	Trace metal (Orange TRACE)	12-20umol/L	CHX	< 2 weeks	Increased in oral contraceptive use, inflammation Age related ref ranges? 3m (1.4-7.2) 4m(3.9-17.3 6m11.1-27.4) 9 yrs (11.3-23.7) 13yrs (9.1-22.5)
Cortisol	Serum (Brown)	Interpretation with report		1 day	
Cortisol test is used for diagnosis and monitoring of adrenal insufficiency. Diagnostic samples are best collected at 8 - 9 am. Due to diurnal rhythm, samples collected at other times have little diagnostic value. Adrenal insufficiency is excluded in most people if result is above 374nmol/L at any time. For samples collected at 8 – 9 am, a result below 100nmol/L is strongly suggestive of adrenal insufficiency unless there is recent use of corticosteroids, please discuss with Endocrinology. To confirm adrenal insufficiency, see Short Synacthen test. This test is not recommended for suspected Cushing's syndrome; please request post-dexamethasone cortisol if performing any dexamethasone suppression test. This method has improved specificity for cortisol, hence diagnostic action limits are lower than with previous supplier's method. However, there is positive interference from prednisolone, prednisone, methyl prednisolone, and from abnormally raised levels of 11-deoxycortisol or 21-deoxycortisol. High-dose biotin supplementation (>5mg/day), or increases in cortisol-binding globulin (eg. oral oestrogen therapy, pregnancy) may cause falsely high cortisol results.					
Cobalt	Trace metal (Orange TRACE)		SAN	1 week	For use of Orthopaedic teams monitoring Metal-on-Metal hip replacements only. Patients consulting GPs with concerns

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
					should be referred back to the responsible surgeon.
Covid-19 PCR (POCT)	Viral swab			4h	Follow Trust POCT approval pathway
Covid-19 PCR (POCT) is for the **rapid** detection of current infection with SARS-CoV-2 virus. Please follow the Trust's current guidance (see Daily Brief) on eligibility and approval for this rapid test or requests will be rejected. The test is available for use with swabs collected from nose, throat, or nasopharynx only. Please answer the questions appropriately when making ICE requests as this will direct samples either to this low capacity rapid pathway or to the high capacity but slower process provided from Cambridge. Tests required on nasopharyngeal aspirates or other fluids must be processed at Cambridge.					
CK (Creatine Kinase)	Serum (Brown)	40-320 (male), 25-200 female U/L		<1 day	Age Range / Sex / CK Reference Range (U/L)
					Up to 11 Mnths old / F / 42-493
					Up to 11 Mnths old / M / 39-320
					Up to 15 Years old / F / 39-191
					Up to 15 Years old / M / 43-178
					>15 Yrs old / F / 25-200
					>15 Yrs old / M / 40-320
Creatinine	Serum (Brown)	M 59-104 µmol/L F 45-84 µmol/L		<1 day	Age / Ref Range(um/L)
					Up to 2 mnths / 27-87
					Up to 1 yr / 14-34
					1-2 yrs / 15-31
					3-4 yrs / 23-37
					5-6 yrs / 25-42
					7-8 yrs / 30-47
					9-10 yrs / 29-56
					11-12 yrs / 39-60
					13/14 yrs / 40-68
					>15 yrs Male / 59-104
					>15 yrs Female / 45-84
Cystic fibrosis (genetic test)	EDTA (Red)		KG	3 -4 weeks	After positive sweat test. Contact lab
Cycloserine	Serum (Brown)		AML	72hrs from receipt in referral lab	Recommend a pre-dose sample and a post-dose sample, taken 3-4 hours after oral administration.
Cyclosporin	EDTA (Red)	0.55-1.15ng/ml 51yrs 0.63-1.44	ADC	<3 days	Collect trough sample just before oral dose
11 deoxycortisol	Serum (Brown)	7-16 nmol/L	KCH	2 – 3 weeks	
7-Dehydro	Lithium	7-16mmol/L	Institute	6-8 weeks	

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
cholesterol	heparin [Orange]		of Child health, Guildford		
5-Alpha Dihydrotestosterone	serum (Brown)	Interpretation with report	KCH		Not a first-line test, rarely needed.
Dexamethasone	Serum (Brown)	Interpretation with report	MWY	72 hrs	Requestable only by laboratory staff
This test is used to assess whether or not adequate dexamethasone blood levels were achieved during an overnight dexamethasone suppression test. When patients fail to suppress cortisol to <50nmol/L (9am sample, after overnight dexamethasone), the laboratory will arrange for dexamethasone blood level to be measured on that sample. Dexamethasone ≥3.0 nmol/L is consistent with adequate absorption and metabolism of dexamethasone. Dexamethasone <3.0 nmol/L suggests impaired absorption or excess metabolism of dexamethasone, an alternative screening test for hypercortisolism is required. It may also indicate dexamethasone has not been taken if non-compliance is suspected.					
DHEA sulphate	Serum (Brown)	Age related Interpretation with report	CHX	1 week	Lower levels with increasing age
Digoxin	serum (Brown)	0.5-2.0ug/L		<1 day	Collect trough just before dose. In toxicity sample at 6 hours post dose. Toxicity occurs at lower levels in old age, hypothyroidism, hypokalaemia, hypercalcaemia and hypomagnesaemia.
Dothiepin	EDTA (red)	25-35	CAR	1 week	
DPD gene (dihydro-pyrimidine dehydrogenase)	EDTA (blue)	Interpretation with report	AGH	1 week	Only available to Oncology teams
DPD gene test screens for 4 variants of the DPD gene that reduce the enzyme activity and are associated with fluoro-pyrimidine toxicity in chemotherapy (eg. 5-fluorouracil, capecitabine, tegafur). Results should be used to reduce dose or select alternative chemotherapy regimen as clinically appropriate. Please note that the absence of any of these 4 genetic variants does not eliminate the risk of toxicity. The test should ony be carried out once, prior to the start of such therapy. Do not repeat the request unless requested to do so by the Laboratory because of a problem with the first sample. This test is not available to screen patients prior to use of topical fluorouracil cream as systemic absorption is too low to cause toxicity.					
Ethylene glycol	EDTA (red)	Interpretation with report	SAN	<3 days	Use admission blood sample
Ethylene glycol test is used in the diagnosis and monitoring of suspected toxic alcohol poisoning. The test also detects methanol. Other blood tube types may be used if the preferred sample is not available, as long as they do not contain gel. The service is available 24/7 for approved diagnostic samples only; please discuss first with Biochemistry Consultant. Please be aware that the presence of ethylene glycol metabolites in blood causes significant elevation in					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
apparent measured lactate, whether measured using a blood gas analyser or the laboratory method. Hence, ethylene glycol poisoning can masquerade as lactic acidosis.					
FK506 (Tacrolimus)	EDTA Red	Interpretation with report	ADC	<3 days	Collect trough sample just before oral dose
Ferritin	Serum (brown)	(M) 300-400 µg/L (F) 13-150 µg/L (F over 60y) 300-400 µg/L		<1 day	
Ferritin test is used in the investigation of anaemia and the diagnosis and monitoring of iron-deficiency or iron-overload states. Ferritin <12 µg/L indicates absent iron stores, however ferritin is a positive acute-phase reactant and may be normal or even raised in the absence of iron stores. High ferritin is commonly caused by chronic inflammation, liver disease, kidney disease, alcohol excess, metabolic syndrome, malignancy. These are all more common as causes of high ferritin than is genetic haemochromatosis. If ferritin is above 1200 µg/L, the patient should be investigated for potential iron overload. The above reference ranges do not apply to the newborn period, infants or children. High-dose biotin supplementation (>5mg/day) may cause falsely low ferritin results.					
FSH (Follicle stimulating hormone)	Clotted (Brown)	Interpretation with report		<3 days	Sample on day 1-3 of cycle. State LMP or amenorrhoea.
Folate	Serum (brown)	>4.5 µg/L		<1 day	
Serum folate test is used in the diagnosis of folate or vitamin B_{12} deficiency; a result <3 µg/L is usually taken to indicate deficiency. Serum folate reflects recent folate status and intake, and a folate-rich meal may transiently elevate a low folate into the reference range. If doubt exists, repeat the test in the fasting state. High-dose biotin supplementation (>5mg/day) may cause falsely high folate results. It is usual to test folate at the same time as vitamin B_{12} due to their shared metabolism and the similar clinical features of deficiency (anaemia, macrocytosis, neurological changes).					
Flecainide	EDTA (red)	0.15-0.9 mg/L	CAR	1 week	
Fluoxetine	EDTA (red)	150-500 ug/L	CAR	1 week	
Fluvoxamine	EDTA (red)	0.1-0.5 mg/L	CAR	1 week	
Free Fatty Acids	Lithium heparin [Orange]	Interpretation with report	GOS	<2 weeks	Send to lab promptly for immediate freezing of plasma
Fructosamine	serum [Brown]	0-282 µmol/L	HOM	1 week	Available only with consultant approval
fPSA (free PSA)	Serum (brown)	<25%		<1 day	Results expressed as %fPSA/PSA
This test is used to assist in the detection of prostate cancer. In men with borderline PSA results and normal DRE, the specificity for detecting prostate cancer may be increased with concurrent use of fPSA. This is expected to detect 92.5% of prostate cancers, and potentially					

<table>
<tr><th>Test</th><th>Sample</th><th>Adult Reference range</th><th>*If referred site code</th><th>Turnaround time</th><th>Comments</th></tr>
<tr><td colspan="6">avoid biopsy in 20% of men over 50 years old who do not have prostate cancer.
The method used is Roche COBAS. Free PSA values may vary depending on the method used, and must only be interpreted with total PSA results also produced using Roche COBAS.
High-dose biotin supplementation (>5mg/day) may cause falsely low fPSA results. Always interpret results in the light of the clinical picture.</td></tr>
<tr><td>FT3 (free tri-iodothyronine)</td><td>Serum (brown)</td><td>3.1-6.8 pmol/L</td><td></td><td><1 day</td><td></td></tr>
<tr><td colspan="6">FT3 test is used in the diagnosis/monitoring of subclinical hyperthyroidism. It can also be helpful in monitoring treatment with liothyronine, and the differential diagnosis of thyroiditis/Graves disease. There is no value in measuring FT3 in patients taking thyroxine. FT3 is only requestable for patients under the care of Endocrinology, or may be added at the discretion of Laboratory Consultant.
High-dose biotin supplementation (>5mg/day) may cause falsely high FT3 results. Due to biotin interference, TFTs in euthyroid patients taking very high-dose biotin may falsely resemble the pattern seen in thyrotoxicosis.
Age related reference ranges
<table><tr><th>Age</th><th>Range (pmol/L)</th></tr><tr><td>0-<1 month</td><td>4.2-13</td></tr><tr><td>1 month -<12 months</td><td>5.2-8.6</td></tr><tr><td>1 year - <17 years</td><td>5-8.2</td></tr><tr><td>>17 years</td><td>3.1-6.8</td></tr></table></td></tr>
<tr><td>FT4 (free thyroxine)</td><td>Serum (brown)</td><td>12-22 pmol/L</td><td></td><td><1 day</td><td></td></tr>
<tr><td colspan="6">FT4 test is used in the diagnosis and monitoring of thyroid disease, and is requested as part of the TFT profile. Interpret results in the light of the TSH result, and the clinical picture. The above reference range does not apply to the newborn period, infants or in pregnancy.
Many drugs affect FT4 results independent of any real effect on thyroid status:
Low FT4 is seen with carbamazepine, frusemide, salicylate and others.
High FT4 is seen with amiodarone, heparin.
High-dose biotin supplementation (>5mg/day) may cause falsely high FT4 results.
Due to biotin interference, TFTs in euthyroid patients taking very high-dose biotin may falsely resemble the pattern seen in thyrotoxicosis.
After starting thyroxine or changing dose, wait 2-3 months before checking TFTs.
Avoid testing TFTs during moderate-severe illness unless there is strong clinical indication, as transient changes in TFTs are common at this time (euthyroid sick syndrome).
Age related reference ranges
<table><tr><td>0 to <1 month</td><td>16</td><td>50</td></tr><tr><td>1 to < 12 months</td><td>14</td><td>22</td></tr><tr><td>1 to <19 years</td><td>13</td><td>21</td></tr><tr><td>≥19 (Roche range)</td><td>12</td><td>22</td></tr></table></td></tr>
<tr><td>Gamma GT</td><td>Serum (Brown)</td><td>Male
15-73U/L
Female
12-43 U/L</td><td></td><td><3 days</td><td>Ranges vary for children. No longer part of LFT. Must be specifically requested.
Age related ref ranges</td></tr>
</table>

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
					Up to 4 Weeks old: 23 - 219 U/L Up to 11 Months old: 8 – 127 U/L Up to 15 Years old: 6 – 21 U/L Females >15 years old: 0 – 37 U/L Males >15 Years old: 0 – 72 U/L
Gabapentin	EDTA (red)	2-20 mg/L	CAR	7 days	Collect trough sample just before oral dose
Galactose-1-Phosphate Uridyl Transferase	Lithium heparin [Orange]	18-40 µmol/h/gHb	CUH	4 weeks	
Gastrin [Part of gut hormone profile]	EDTA Red	<40pmol/L	CHX	4 weeks	Fasting sample required. Send to lab promptly for immediate freezing of plasma
Guanidino Acetic Acid [GAA]	Lithium heparin [Orange]	Interpretation with report	ADI		
Gentamicin	Serum red top	For once a day dosing Pre dose <1.0mg/L (adults) <2.0mg/L (neonates)		2hours from receipt, inform lab if urgent	Inform lab if urgent Refer to antibiotic guidelines on KC for further information For b d dosing eg endocarditis discuss with Cons.Microbiologist
Glucose	Fluoride EDTA (Yellow)	3.5-6.0 mmol/L fasting		<1 working day	
Growth Hormone (HGH)	Serum (Brown)	Interpretation with report	CHX	1 week	Random samples rarely helpful. Use dynamic function tests instead
Gut hormone profile (Gastrin, Glucagon, pancreatic polypeptide, somatostatin, vasoactive intestinal peptide & chromogranin A & B)	EDTA Red	Interpretation on report	CHX	4 weeks	Fasting sample required. Send to lab promptly for immediate freezing of plasma
HbA1c (glycated Hb)	EDTA Red			<3 days	
hCG (human chorionic gonadotrophin)	Serum (Brown)	0-4U/l		<1 day	For diagnosis and monitoring of ectopic pregnancy or germ cell tumour

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
HDL cholesterol	Serum (Brown)	See guidelines in BNF		<1 day	
HLA B27	EDTA- (Blue)		CUH	14 days	The presence or absence of HLA-B27 is used in the differential diagnosis of a number of inflammatory diseases
HMGCR autoantibodies	Serum (brown)	Negative = <14.9 CU/ml Equivocal = 15-24.9 CU/ml Positive = >25.0 CU/ml	OXF	14 days	
17-hydroxy-progesterone (17OHP)	Serum (brown)	0-5nmol/L (adults)	ADI	2 weeks	Reference ranges vary in children.
17OHP test is a first-line investigation in the diagnosis of congenital adrenal hyperplasia (CAH) due to deficiency of an enzyme in the steroid synthetic pathway (most commonly 21-hydroxylase, but also 11-hydroxylase and 3-beta hydroxysteroid dehydrogenase deficiency). 21-hydroxylase deficiency is excluded if 17OHP is within the reference range. 17OHP is high at birth and decreases to the reference range after about 48h; to avoid false positives blood should not be collected from newborns before they are 48h old. Classical salt-losing 21-OHylase deficiency usually presents clinically in the **second** week of life. 17OHP may remain high for longer than 48h in premature babies and term babies who are sick. In adult women suspected of non-classical CAH, collect blood in the early morning and in the follicular phase (results are higher in the luteal phase). For full diagnosis, a short Synacthen test is required that measures steroid precursors as well as cortisol.					
Plasma Homocysteine	Lithium heparin [Orange]	5-15 µmol/L	QUE	1-3 weeks	Send to lab promptly for immediate freezing of plasma
Plasma homocysteine test may be used when there is strong clinical suspicion of vitamin B12 deficiency (peripheral axonal neuropathy, subacute degeneration of spinal cord) but serum B12 results are indeterminate (200 - 300ng/L). Homocysteine is typically raised in vitamin B12 deficiency, but also in folate deficiency, vitamin B6 (pyridoxine) deficiency, and several other conditions. It is also increased in renal impairment. This test may also be used in the diagnosis of homocystinuria. Do not use this test as a marker of cardiovascular risk.					
Total β Hexosaminidase	Lithium heparin Orange	Interpretation with report	GOS	6-8 weeks	
Hexosaminidase A	Lithium heparin, whole blood [Orange	Interpretation with report	GOS	6-8 weeks	
Immunoglobulins (IgG, IgA, IgM)	Serum (Brown)	Refer to immunology handbook	ADI	<3 days	Ranges vary for children

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
Insulin	serum (Brown)	Interpretation with report	RSC / GOS	1 week	Send to lab promptly for immediate freezing of serum. Test will only be undertaken if glucose level is <2.5 mmol/l RSC is for adult samples GOS for paed samples
Insulin like growth factor (IGF-1)	Serum (Brown)	13-64nmol/L	CHX	1 week	Higher values in children. Age related ranges on reports
IGF-Binding Protein 3	Serum (Brown)	Interpretation with report	RSC	1 week (as required)	
Inhibin B	Serum (Brown)	Interpretation with report	SHP	2 weeks	
Imipramine	EDTA (red)	75-160µmol/L	CAR	1 week	
Iron (Fe)	Serum (Brown)	5.83-34.5µmo/L		<1 day	Ferritin is better test for iron deficiency
Lactate	Fluoride EDTA (Yellow)	0.6-2.5 mmol/l		<1 day	
Please be aware that the presence of ethylene glycol metabolites in blood causes significant elevation in apparent measured lactate, whether measured using a blood gas analyser or the laboratory method. Hence, ethylene glycol poisoning can masquerade as lactic acidosis					
Lactate dehydrogenase (LDH)	Serum (Brown)	135-225 IU/L		<1 day	Ranges vary in children
Lamotrigine	EDTA (red)	3-15 mg/L	CAR	2-3- weeks	
Laxative screen [urine]	Random urine	Interpretation with report	CAR	1 week	
LDL cholesterol	Serum (Brown)	0-3 mmol/L		<1 days	Calculated from other lipid values if triglycerides <4.5 mmol/l
Lead (Pb)	EDTA Red	Environmental exposure <0.6umol/L	CHX	<2weeks	For guidance on industrial exposure contact laboratory. Test done on whole blood.
Levetiracetam	EDTA (red)	10-37 mg/L	CAR	2 -3 weeks	By prior arrangement with consultant only
Liver function tests (LFTs)	LFTs comprise ALT, ALP, albumin, bilirubin (total). See individual tests for further information. Repeat testing of LFTs is rarely useful within 72 hours of a previous test, but more frequent monitoring **may** be needed in acute liver injury, acute paracetamol poisoning, and ICU patients. Please request tests individually if you do not require all 4 results (eg. ALT is usually sufficient when monitoring statin treatment).				
Lipid profile	Serum			<1 day	Fasting sample required (12 h)

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
(fasting)	(Brown)				see cholesterol, HDL cholesterol, LDL cholesterol & triglycerides.
Lipoprotein A	Serum (Brown)	0-32 nmol/L	CUH	1 -2 weeks	By prior arrangement with consultant only
Free Light Chains	Serum (Brown)	Interpretation with report	CUH		For Haematologists and Renal only
Lithium	Serum (Brown)	0.4-1.0mmol/L		<1 day	
Luteinising hormone (LH)	Serum (Brown)	Interpretation with report	CUH	<1 day	
Magnesium	Serum (Brown)	0.7-1.0mmol/L		<1 day	Age related ref ranges Up to 4 weeks old 0.6-1.0mmol/L >4 weeks old 0.7-1.0mmol/L
Manganese	Trace metal (dark Green)	9-25 nmol/L	CHX	<2 weeks	
Mannose Binding Lectin	Serum (Brown)	0.7-6.0 mg/L	SHP	7 working days	
This test should only be used if Mannose Binding Lectin (MBL) deficiency is suspected, as it is associated with an increased risk of infection when the adaptive immune system is immature (early childhood), or when it is suppressed (e.g., transplantation, chemotherapy treatment).					
Mercury	EDTA Red	<30nmol/L	CHX	<2 weeks	Done on whole blood for organic Hg exposure. Urine preferred for inorganic mercury
This test should be used only for cases of suspected poisoning with organomercury compounds such as methyl mercury (antifungal compound previously used in agriculture) Do not use in relation to dental amalgam fillings. There is no convincing evidence that these cause any adverse health effects.					
Metabolic stone screen (blood)	Serum (Brown)			<1 day	Na+, K+, HCO3, Urea, Creatinine, Albumin, Ca++, PO4 and urate
Methaemoglobin	Heparinised syringe	<1.5%		<1 day	Seal with cap provided. Do not send via pneumatic chute. Label sample.
Methylmalonic acid (MMA)	Plasma	In the context of a raised total homocysteine and the absence of renal impairment: < 0.29 mmol/l are considered	QUE	<2 weeks	

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
		not indicative of B12 deficiency 0.29-0.70 mmol/l suggests B12 deficiency > 0.70 mmol/l consistent with overt B12 deficiency Supported by in house data			
Plasma methylmalonic acid test may be used when there is strong clinical suspicion of vitamin B12 deficiency (peripheral axonal neuropathy, subacute degeneration of spinal cord) but serum B12 results are indeterminate (200 - 300ng/L). MMA is typically raised in vitamin B12 deficiency, but not in folate deficiency. It is also increased in renal impairment. It should not be used for diagnosing methylmalonic aciduria as it lacks sensitivity for this purpose, and urinary MMA should be used instead.					
Metadrenalines Blood	EDTA [Red]	Interpretation with report	MAN	2-3 weeks	Send to lab promptly for immediate freezing of plasma. Patient should have indwelling venous catheter and be supine for 30mins before sampling.
Myelin Oligodendrocyte (MOG)	Serum (Brown)	Interpretation with report	ION	<2 weeks	
Neurotensin	EDTA Red	Interpretation with report	CHX	3 weeks	Send to lab promptly for immediate freezing of plasma
Neurone specific enolase (NSE)	Serum (Brown)	<13µg/L	CHX	4 weeks	
Oestradiol	serum (Brown)	M28-156 pmol/L		1 day	Reference ranges for females are on the report
Oestradiol test is for use in investigation of disorders of sexual development, patients using oestrdiol implants, gynaecomastia in males, or possible oestrogen secreting tumour. It is not recommended when querying menopausal status. High-dose biotin supplementation (>5mg/day) may cause falsely high oestradiol results. Always interpret results in the light of the clinical picture.					
Olanzapine	EDTA (red)	20-40 µg/L	KIT	2 weeks	By prior arrangement with consultant only
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses.					
Osmolality	Serum (brown)	275-295 mmol/Kg		<1 day	
This test can be useful in the differential diagnosis of hypo- or hyper-natraemia, especially if compared to a					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
urine osmolality collected at the same time. It can also used in combination with serum Na, K, urea, and glucose results to calculate the osmolal gap, which can aid in the diagnosis of poisoning by toxic alcohol such as methanol, ethylene glycol etc.					
Oxalate, Blood	EDTA [Red]	Interpretation with report	UCLH		
Oxcarbazepine	EDTA (red)	Interpretation with report	CAR	7 days	By prior arrangement with consultant.
Pancreatic polypeptide [Part of gut hormone profile]	EDTA Red	Interpretation with report	CHX	4 weeks	Fasting sample required. Send to lab promptly for immediate freezing of plasma.
Paracetamol	Serum (Brown)	10-30mg/l therapeutic		<1 day	Overdose – collect at least 4 hours after overdose. See BNF for interpretation and treatment guidelines
Parathyroid hormone (PTHi)	EDTA Red	1.6-6.9 pmol/L		<8 days	
pH	Pleural Fluid/ Urine	Stated on report		30 mins	Must arrive in the laboratory promptly for immediate analysis
Phenobarbitone	Serum (Brown)	10-40mg/L		<3 days	
Phenylalanine	Blood spot card or Lithium heparin can be used	55-206µmol/L	GOS	1-2 weeks	Send to lab promptly for immediate freezing of plasma
Phenytoin	Serum (Brown)	5-20mg/L		<3 days	
Phosphate (PO4)	Serum (Brown)	0.8-1.5mmol/L		1 day	Ranges vary in children
Placental growth factor (sFlt1/PlGF ratio)	Serum (brown)	0-37ng/L		<1 day	
This test is offered for the rapid rule-out of pre-eclampsia for up to 1 week, in pregnant women between 20 and 35 weeks gestation.					
Post-dexamethasone cortisol	Serum (brown)	<50nmol/L		1 day	
This test is used to exclude hypercortisolism (Cushing's syndrome) in patients at low risk. Dexamethasone should be taken at 11pm - 12 midnight. Collect blood sample at 8 - 9 am next morning. See cortisol test for important information about limitations of the cortisol assay.					
Potassium	Serum (Brown)	3.5-5.3mmol/L		<1 day	Values increased by haemolysis and prolonged contact with red cells

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
Procalcitonin	Serum (brown)	0-0.05µg/L		<4h	
Procalcitonin test is used to aid in deciding whether an infection is viral or bacterial, and can also be used to guide the need for antibiotic therapy. Currently only available for requesting by ICU Consultants, or others after approval by Consultant Microbiologist. Result <0.5 µg/L represents a low risk of severe sepsis and/or septic shock Result >2.0 µg/L represents a high risk of severe sepsis and/or septic shock					
Porphyrins	EDTA Red	Interpretation with report	BED	1 week	For detection of porphyrias with non-acute presentation. Exclude light from samples.
Procollagen III peptide (P3NP, PIII NP)	Serum (Brown)	1.2-4.2µg/L	LTH	2-3 weeks	Requested by dermatology only
Procainamide	EDTA (red)	Interpretation with report	CAR	7 Days	
Progesterone	Serum (Brown)	Day 21 3-95nmol/L		<3 days	Record day of cycle and treatment. Ovulation likely if mid luteal phase level >30 mmol/l
Prolactin	serum (Brown)	Male 86-324 mIU/L Female 102-496 mIU/L		<3 days	
Protein electrophoresis	serum (Brown)	Interpretation with report		<7 days	Early morning urine for BJP is required as part of the myeloma screen
Prostate Specific Antigen (PSA)	Serum (brown)	Age-related ranges, see comments		<1 day	<40y 0-1.4 µg/L 40-49y 0-2.0 µg/L 50-59y 0-3.1 µg/L 60-69y 0-4.1 µg/L ≥70y 0-4.4 µg/L
This test is used in the detection and monitoring of prostate cancer. In men with borderline results and normal DRE, the specificity for detecting prostate cancer may be increased with concurrent use of fPSA. The method used is Roche COBAS. PSA values may vary depending on the method used. High-dose biotin supplementation (>5mg/day) may cause falsely low PSA results. Always interpret results in the light of the clinical picture.					
Pyruvate	Special tube needed. Discuss with lab	<0.18 mmol/L	GOS	1 -2 weeks	By prior arrangement with consultant
Quetiapine	EDTA (red)		KIT	2 weeks	By prior arrangement with consultant only
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses.					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
Renal function tests	Renal function tests comprise Na, K, urea, creatinine, eGFR. See individual tests for further information.				
Renin	EDTA (red)		ADI	2 weeks	Please note this is a mass assay and not an activity assay.
Retinol Binding Protein (Urine)	Fresh random urine	Interpretation with report	GOS	1-3 weeks	Freeze soon after collection and send frozen.
Risperidone	EDTA (Red)		KIT	2 weeks	By prior arrangement with consultant only
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses.					
Salicylate	Serum (Brown)	>300mg/l toxic		<1 day	See BNF for guidelines
Selenium	Trace metal (dark Green)	0.85-1.46 µmol/L	CHX	<2 weeks	
Sertraline	EDTA plasma (trough level)	With report	CAR	7 days	
Sex hormone binding globulin (SHBG)	Serum (Brown)		CUH	1 week	
Sirolimus (Rapamune)	EDTA (Red)	Interpretation with report	ADI	<3 days	Collect trough sample just before oral dose
Sodium (Na+)	Serum (Brown)	133-146 mmol/L		<1 day	
Somatostatin [part of gut hormone profile]	EDTA (Red)	Interpretation with report	CHX	2 -3 weeks	Fasting sample required. Send to lab promptly for immediate freezing of plasma
Squamous cell carcinoma antigen (SCC)	serum (Brown)	<150ng/dL	CHX	<1 week	
Steroid Profile	Random Urine.	Interpretation with report	UCLH	2 -3 weeks	
Sulpiride	EDTA (Red)		KIT	2 weeks	By prior arrangement with consultant only
This test is occasionally needed for dose adjustment in patients prescribed anti-psychotics, who are on relevant co-medication, smoker etc or who are prescribed off-licence doses.					
Sulphonylurea	Serum (Brown)	Interpretation with report	RSC	2 weeks	
Short Synacthen	Serum	Interpretation		1 day	Samples to be collected at 0 mins,

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
test	(brown)	with report			30 mins and 60 mins post-synacthen injection.
Short Synacthen test (SST) is used in diagnosis of adrenal insufficiency. In patients already taking corticosteroids, postpone SST until at least 18-24h after the last dose, and longer if taking synthetic cotrticosteroids. It is usually helpful to collect blood for ACTH test before the Synacthen injection. Stimulated cortisol result should be above 374nmol/L See cortisol test for important information about limitations of the cortisol assay.					
Tacrolimus (FK506)	EDTA (Red)	Interpretation with report	CUH	<3 days	Collect trough just before oral dose
Teicoplanin	Serum (brown)	Interpretation with report	MWY	<5 days	Collect trough sample just before next dose
Testosterone	Serum (brown)	0.1-1.7 nmol/L (adult female). Age-related ranges for adult males, see comments		<3 days	Adult male reference ranges 19 to 39y 8.0 – 31.3 40 to 49y 7.2 – 31.3 50 to 59y 6.7 – 31.3 60 to 79y 6.6 – 31.3 80 to 99y 4.1 – 31.3
This test is used in the diagnosis and monitoring of disorders of androgen production, disorders of sexual development, and for monitoring androgen suppression therapy in prostate cancer. In adult men there is a wide diurnal variation in testosterone levels; the quoted reference ranges assume phlebotomy at around 09:00am (± 2h). Results from samples collected in the late afternoon from healthy young men may be only about half of those found in 09:00am samples, and are not easily interpreted. For children, reference ranges based on Tanner stage are printed on the report. High-dose biotin supplementation (>5mg/day) may cause falsely high testosterone results. Always interpret results in the light of the clinical picture.					
TFTs (thyroid function tests)	Serum (brown)	TFT profile comprises TSH and FT4. See individual tests for more information.			
Theophylline	serum (Brown)	10-20mg/L		<1 day	Oral sustained release – collect before dose. IV – collect 6 and 18hrs post dose.
Thiopentone	EDTA (red)	Interpretation with report	MTL	<24 hrs	
Thiopurine metabolites (6-TGNs)	EDTA whole blood (red)	235-450 pmol/8x10^8 RBC	SAN	< 1 week	
This test is used in patients with a poor response to thiopurine drugs, to distinguish those with inadequate dosing or poor adherence to medication from those who are resistant to the drug and need alternative therapy (~20% of those with normal TPMT). Samples should be collected no less than 4 weeks after initiation of therapy, or a change in dose. The t½ is several days so samples can be collected at any time in relation to the dose. 6-methylmercaptopurine nucleotides (6-MMPNs) are also reported (reference range <5700 pmol/8x10^8 RBC). 6MMPNs are inactive in terms of therapeutic effect, but are hepatotoxic. Although a mixture of molecules, 6-TGNs correlate well with clinical response and can be used to some extent in dose optimisation.					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
TPMT (thiopurine methyl transferase)	EDTA whole blood (red)	68-150 mU/L	SAN	< 1 week	
TPMT test is used to guide dosage of thiopurine drugs such as azathioprine. Guidelines recommend assessing TPMT status before starting treatment. These drugs are metabolised to inactive products by TPMT. 11% of the population has low levels of TPMT so is more susceptible than normal to toxic effects such as myelosuppression. Note that TPMT status fails to predict the majority of myelosuppression with these drugs, and ongoing FBC and LFT monitoring remains pivotal to safe therapy. Blood transfusion within the last 90 days may misclassify TPMT status and mask a deficient TPMT result. This test assesses the patient's phenotype, hence it should not generally ever be repeated.					
Thyroglobulin	Serum (brown)	After total thyroidectomy or I^{131} ablation: <0.1µg/L Birth-3 weeks: 10-250µg/L	CVU	~8 days	Includes thyroglobulin antibodes (TgAb)
Thyroglobulin test is used to assess whether any thyroid tissue remains after total thyroidectomy or I^{131} ablation, in patients with known thyroid cancer. It may rarely be used to assess newborns with suspected thyroid development problems. Because endogenous thyroglobulin antibodes (TgAb) can interfere with thyroglobulin assays, TgAb are also reported at the same time. High-dose biotin supplementation (>5mg/day) may cause false thyroglobulin results. Always interpret results in the light of the clinical picture.					
Topiramate	EDTA (red)	Interpretation with report	CAR	7 days	By prior arrangement with consultant only
Total protein (TP)	Serum (Brown)	60-80g/L		<1 day	
Transferrin	Serum (Brown)	2-3.4 g/L		<1 day Mon-Fri	
Transferrin Glycoforms	Serum (Brown) /heparin Plasma 0.5ml	Interpretation with report	ION	<10 days	
Triglycerides	Serum (Brown)	0.3-1.8mmol/L		<1 day	See also lipids – fasting specimen required
Troponin T	Serum (brown)	0-14 ng/L		<4h <1h for ED	
This test is used to assess the risk of acute coronary syndrome or myocardial infarction in patients with ischaemic symptoms. High-dose biotin supplementation (>5mg/day) may cause falsely low troponin T results. Always interpret results in the light of the clinical picture. The above reference range does not apply to dialysis patients, newborns, or infants.					
Tryptase	Serum (brown)	2-14 µg/L	SAN	<1 week	
Tryptase test is used mainly in the investigation of suspected anaphylaxis, but may rarely be required in the					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
investigation of systemic mastocytosis. Tryptase, histamine, and other mediators of allergic response are released from mast cell granules when mast cells are activated. For suspected anaphylaxis, serial samples should be collected to follow the kinetics of release: within 1h of reaction, and subsequently at 3h and 24h. Peak levels of >40 μg/L are associated with anaphylaxis.					
TSH (thyroid stimulating hormone)	serum (brown)	0.27-4.2 mU/L		<1 day	
TSH test is used in the diagnosis and monitoring of thyroid disease. It is usually requested as part of the TFT profile. Interpret results in the light of the FT4 result, and the clinical picture. The above reference range does not apply to the newborn period, infants or in pregnancy. In the special case of monitoring stable patients taking thyroxine, TSH alone may be requested without FT4. High-dose biotin supplementation (>5mg/day) may cause falsely low TSH results. Due to biotin interference, TFTs in euthyroid patients taking very high-dose biotin may falsely resemble the pattern seen in thyrotoxicosis. After starting thyroxine or changing dose, wait 2-3 months before checking TFTs. Avoid testing TFTs during moderate-severe illness unless there is strong clinical indication, as transient changes in TFTs are common at this time (euthyroid sick syndrome). Age related reference ranges are reported.					
Urea & electrolytes (U/E)	serum (Brown)			<1 day	See NA+, K+, Urea & Creatinine
Urate	Serum (Brown)	200-430 male 140-360 female μmol/L		<1 day	
Urea	serum (Brown)	2.5-7.8mmol/L		<1 day	
Valproate, Valproic acid, Sodium Valproate	Serum (Brown)			<3 days	Only available for neurology and psychiatry unless discussed with laboratory consultant Valproate is not a useful marker of treatment efficacy: use only to confirm compliance or self poisoning
Vancomycin	Serum (brown)	10-20 mg/L		<8 hours	
This test is used to optimise dosage to achieve maximal antimicrobial effect (ensure levels are at least 10mg/L) whilst minimising the risk of nephrotoxicity. For severe infections involving MRSA pneumonia, osteomyelitis, endocarditis, and bacteraemia, adjust dose to achieve an optimal target concentration of 15-20mg/L. Further interpretation is given on the report.					
Venlafaxine	Serum [no gel separator tubes]	Interpretation with report	CAR	1 week	Only by prior arrangement with consultant
Vasoactive intestinal	EDTA Red	<30pmol/L	CHX	4 weeks	Send to lab promptly for immediate freezing of plasma.

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
polypeptide (VIP) [part of gut hormone profile					
Very long chain fatty acids (VLCFA)	Lithium heparin (Orange)	Interpretation with report	GOS	2 -4 weeks	Send to lab promptly for immediate freezing of plasma A fasting sample is preferred
This test is used in the investigation of peroxisomal disorders where there is a defect in the metabolism or processing of very long chain fatty acids (i.e. fatty acids with a carbon length >22). The test is particularly useful for the diagnosis of X-linked adrenoleukodystrophy in males. However, a normal very long chain fatty acid profiles may be seen in asymptomatic female carriers. The test also includes pristanate and phytanate measurement which are useful for the diagnosis of Refsum disease, methyl-acyl CoA racemase deficiency and rhizomelic chondrodysplasia punctata (depending on the age of the patient). A fasted sample is preferred due to dietary influence on VLCFA levels.					
Vigabatrin	EDTA (red)	5-35mg/L therapeutic	CAR	2-3 weeks	
Vitamin A	Serum [Brown] or Lithium heparin [Orange]	1.1-2.8 µmol/L	GOS	2-4 weeks	Protect sample from light. Send to lab promptly for immediate freezing of plasma
Vitamin B_{12}	Serum (brown)	200-770 ng/L		<1 day	
Vitamin B_{12} test is used in the diagnosis of vitamin B_{12} or folate deficiency. In the presence of strong clinical suspicion, low serum vitamin B_{12} (<200 ng/L) is consistent with deficiency. Normal vitamin B_{12} does not exclude deficiency if there are strong clinical features; to avoid neurological impairment, treatment should not be delayed. Vitamin B_{12} falls by 30% by the third trimester of pregnancy. In the absence of strong clinical suspicion, slightly low vitamin B12 (150-200ng/L) may be physiological in late pregnancy. Repeat testing is not needed in patients with vitamin B12 deficiency. In subclinical deficiency (vitamin B12 level 150-200ng/L in the absence of symptoms), vitamin B12 level may be checked after 2 months. High-dose biotin supplementation (>5mg/day) may cause falsely high vitamin B_{12} results. It is usual to test folate at the same time as vitamin B_{12} due to their shared metabolism and the similar clinical features of deficiency (anaemia, macrocytosis, neurological changes).					
Vitamin D (25OHD)	Serum (brown)	> 50nmol/L	NNH	1 -2 weeks	25-50nmol/L may be inadequate in some people. < 25nmol/L: treatment recommended
Vitamin D test is used in the diagnosis of vitamin D deficiency or, rarely, toxicity. Asymptomatic individuals at increased risk of vitamin D deficiency (elderly, dark skin etc) should take a daily supplement of 400 IU,					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
they do not need a vitamin D test. Vitamin D test is recommended in patients with bone diseases that may improve with vitamin D treatment (osteomalacia, osteoporosis, hyperparathyroidism). It is also appropriate in those with chronic musculoskeletal pain or other symptoms possibly attributable to osteomalacia. Patients taking vitamin D supplements do not need routine vitamin D monitoring, except perhaps those with symptomatic deficiency, malabsorption, or where poor adherence is suspected. Any repeat test should be at least 3 months after dosage change. Do not measure vitamin D in patients taking alfacalcidol or calcitriol; these substances are not measured by the assay. It is recommended to check serum calcium one month after starting vitamin D supplements, in case previously undiagnosed hyperparathyroidism is unmasked.					
Vitamin E (tocopherol)	Serum (brown)	11.5-35.0µmol/L	GOS	2 -4 weeks	
Zinc	Trace metal (orange)	9.8-19µmol/L	CHX	<2 weeks	

Biochemistry urine tests – if the assay required is **NOT** listed then please contact the department directly. All results are reported with reference ranges and/or an interpretative comment. Advice on appropriate requesting and interpretation of results is available at all times from the Chemical Pathologists and Clinical Biochemists.

Indicative turnaround times are given for non-urgent situations. It may be possible to expedite results by discussing the clinical situation with the laboratory consultant staff.
If a required test is not listed here, please discuss with the laboratory consultant staff.

For full referral address refer to Appendix 1 (Blood sciences)

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
5-hydroxyindole acetic acid (5-HIAA)	24hr collection into 25 mL 5M HCL	0-50 µmol/24hr	MWY	2-3 weeks	For 48h before and during the collection, avoid eating banana, tomato, walnut, aubergine, avocado, pineapple
Urine 5-HIAA test is now replaced by serum 5-HIAA, which is simpler and more convenient for patients, does not require 3 days of dietary restrictions, and avoids risk of harm to patients associated with the strong acid in the collection bottle . Please use the serum test instead, or discuss with Biochemistry Consultant if you feel the urine test is still warranted.					
Albumin (microalbumin)	Random urine - plain	Reported as ACR, see comments		<1 day	Reference ranges: <3.5mg/mmol creatinine (female) <2.5mg/mmol creatinine (male)
Urine albumin test is an early and sensitive marker for chronic kidney disease. It can be temporarily raised by UTI, physical illness, exercise, diurnal variation (higher during the day than at night), and contamination with secretions from the urinary tract etc; hence new occurrences should be confirmed using an early morning urine. No reference range is quoted for urine albumin concentration as it varies with urine dilution. Results are always reported as albumin/creatinine ratio (ACR).					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
ACR has a long established role in diabetes, to detect microalbuminuria (ACR persistently high but below 30mg/mmol).					
Amino acids	Random urine - plain	See report	GOS	2 weeks	Send fresh urine sample promptly to lab
Urine amino acid analysis should only be requested for the identification of renal amino acid transport disorders (e.g., cystinuria, lysinuric protein intolerance or hartnup disease) or as a marker of renal tubular function. The test is also indicated in the investigation of hypophosphatasia and prolidase deficiency. For the majority of amino acids renal tubular (re) absorption should be >95%. Please note that the plasma is the sample type of choice for the investigation of most inherited disorders of amino acid metabolism.					
Amylase	24 hr urine collection - plain	0-1100 IU/24hrs		<1 day	
Arsenic	Random urine - plain	See report	CHX	2 -3 weeks	
Bence Jones protein (BJP)	Random urine - plain	See report	ADI	<7 days	
Calcium	24hr collection into 25 mL 5M HCL	2.5-7.5 mmol/24hrs		<1 day	
Chloride	24 hr urine collection - plain	110-250 mmol/24hr		<1 day	
Citrate	24hr collection into 25 mL 5M HCL	Male 0.6-4.8 mmol/24hr Female 1.3-6.0mmol/24 hr	UCLH	2 -3 weeks	
Copper	24 hr urine collection - plain	0-1.2 µmol/L	CHX	< 2 weeks	
Cortisol (urine free Cortisol, UFC)	24 hr urine – plain	50-270nmol/24 hr	ADI	<2 weeks	
Creatinine	24 hr urine collection –plain, or random urine	See comments		< 3 days	Reference ranges: 6-13 mmol/24h (female) 9-19 mmol/24h (male)
Urine creatinine is rarely required on timed collections, except when used as a measure of dialysis adequacy. It is mainly used as a component of other urine tests, to compensate for variation in urine dilution (eg. ACR and PCR).					
Creatinine Clearance		60-120ml/min	ADI	< 3 days	

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
Cobalt	Random urine - plain	Interpretation with report	CHX	< 2 weeks	
Cystine	24hr collection into 25 mL 5M HCL	0-600 µmol/ 24hr	UCLH	2 -3 weeks	
Diuretic Screen	Random urine - plain	See report	City Hospital, B'ham	1 week	
Drugs of Abuse screen	Random urine - plain	Not detected	SAN	2 -3 weeks	Includes Creatinine, amphetamesbarbiturates, benzodiazepines, THC, cocaine, methodone & opiates.
FIT (Faecal immunoturbidimmetry	Sample kit provided for faecal sample	See report		5 days	
Glycolate	24hr collection into 25 mL 5M HCL	4-36 µmol/mmol creat	UCLH	2 -3 weeks	
HVA (homovanillic acid)	See VMA				
Iodine	24 hr urine collection - plain		CHX	1 month	
Laxatives	Random urine - plain	See report	CAR	2 weeks	Discuss case with laboratory consultant first
Mercury	24 hr urine collection - plain	<5 nmol/mmol creat	CHX	<2 weeks	Use for exposure to mercury vapour or inorganic mercury. Use blood test for organic mercury
Metabolic stone screen (urine)	24 hr urine collection - plain PLUS 24hr collection into 25 mL 5M HCL	See report	UCLH	2-3 weeks	Profile includes: sodium, potassium, calcium, citrate, cystine, oxalate, & urate
Metadrenalines (metadrenaline, normetadrenaline & 3-methoxy tyramine)	24hr collection into 25 mL 5M HCL	See report	STH	<2 weeks	
Urine metadrenalines test is the first-line investigation used in the diagnosis of suspected phaeochromocytoma. Note that severe stress (MI, hypoglycaemia, surgery) and some drugs can cause physiological increase in some or all of the metadrenalines (eg. all dopaminergic drugs such as L-dopa and methyldopa, doxazosin,					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
tricyclic anti-depressants, phenoxybenzamine, MAO inhibitors, methylphenidate, amphetamine). Consideration should be given to stopping these drugs before advising the patient to do the urine collection.					
Metadrenalines, random urine	Random urine - plain	See report	STH	<2 weeks	
This test must only be used in children who are not capable of accurately collecting a 24h urine specimen. It is the first-line investigation in the diagnosis of suspected phaeochromocytoma; for suspected neuroblastoma in children, request random urine VMA instead. Samples must be fresh and handed directly to a member of laboratory staff for acidification. Do not request this test in adults: instead use 24h urine metadrenalines. This is because reference ranges and interpretation of 24h urines are more robust than those for random urines.					
Microscopy (Sedimax analyser)	Random urine- can be collected at any time but first thing in the morning is the recommended optimal time of collection Sterile Boric acid container preferred as preserves sample for longer but sterile plain also accepted.		A minimum of 2.5ml of sample is required for microscopy however a dilution can be performed with as little as 0.5ml of sample. If a sample needs to be sent for culture then more will be required. Analysis occurs same day in-house between 9am and 5pm Monday to Friday. Out of hours samples are sent directly to CUH for analysis via regular Citysprint shuttle run to microbiology department.		
Mucopoly-saccarides	Random urine - plain	See report	GOS	4 weeks	
Magnesium	24 hr urine collection - plain			<3 days	Discuss case with laboratory consultant first
Magnesium	Random urine – plain			< 1 day	May be used to determine cause of hypomagnesaemia.
Mercury	Random urine - plain	See report			24h urine may be used if preferred
This test should be used only for cases of suspected poisoning with metallic mercury or inorganic mercury compounds. Do not use in relation to dental amalgam fillings. There is no convincing evidence that these cause any adverse health effects.					
N-Telopeptide Crosslinks NTX	Random urine - plain		CHX	3 weeks	
Osmolality	Random urine - plain	40-1400 mOsmol/kg		<1 day	For water deprivation test, consult laboratory consultant first
Organic acids	Random urine - plain	See report	ADI	2-4 weeks	Fresh sample required
Urine organic acid analysis is a core metabolic test and is useful aid for the diagnosis of organic acidurias and a number of inherited metabolic disorders including those of amino acid metabolism (e.g., urea cycle					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
defects, Maple Syrup Urine Disease).					
Oxalate	24hr collection into 25 mL 5M HCL	100-460 µmol/24hr	UCLH	2 -3 weeks	
pH Urine	Random urine collected in a universal container.			< 1 day	pH should be analysed within an hour of sample collection
Phosphate	24hr collection into 25 mL 5M HCL	15-50 mmol/24hr		<3 days	
Porphobilinogen (PBG)	Random urine - plain Exclude light	See report	BED	<2 weeks	Can be expedited if acute situation.
Purines and pyrimidines	Random urine - plain	See report			Send fresh sample promptly to lab
Porphyrins	Random urine - plain Exclude light	See report	BED	<2 weeks	
Steroid profile	Random urine - plain	See report	UCLH	2 -3 weeks	
Sulphite	Random urine - plain	See report		2-3weeks	Send fresh sample promptly to lab
Sulphocysteine	Random urine - plain	See report	UCLH	2-3weeks	Send fresh sample promptly to lab
This test is used in the diagnosis of molybdenum cofactor deficiency and isolated sulphite oxidase deficiency.					
Potassium	24 hr urine collection - plain	35-100 mmol/24hrs	ADI	<3 days	
Protein	24 hr urine collection - plain OR random urine - plain	<0.14g/L OR reported as PCR, see comments		<1 day	Reference range for PCR: < 15mg/mmol creatinine
Urine protein is used in the diagnosis and monitoring of kidney disease and dialysis efficiency. It is also used					

Test	Sample	Adult Reference range	*If referred site code	Turnaround time	Comments
in the diagnosis of hypertensive disorders of pregnancy. No reference range is quoted for urine protein concentration as it varies with urine dilution. Results are always reported as protein/creatinine ratio (PCR). In general, random urine PCR is the recommended test, especially when used in pregnancy.					
Sodium	24 hr urine collection - plain	110-240 mmol/24hrs	ADI	<3 days	
Urate	24 hr urine collection - plain	1.5-4.5 mmol/24hrs	ADI	<3 days	
Urea	24 hr urine collection - plain OR random urine - plain	428-714 mmol/24h		<3 days	
Urine urea is mainly used for monitoring dialysis efficiency					
VMA (vanillylmandelic acid)	Random urine - plain		ADI	<4 days	Assay is routinely run on Tuesdays and Thursdays
VMA test is performed with HVA (homovanillic acid). Together they are used in the diagnosis and monitoring of neuroblastoma. Urgent diagnostic tests can be reported within 24h if they are Consultant requests and agreed in advance. This test is about 90% sensitive for neuroblastoma; a normal result does not entirely exclude it. Several drugs can interfere, especially L-dopa. Samples must be fresh and handed directly to a member of laboratory staff for acidification. For suspected phaeochromocytoma in children, request plasma metadrenalines instead.					

Biochemistry Miscellaneous Tests CSF, fluids, stool samples

If the assay required is **NOT** listed then please contact the department direct. All results are reported with reference ranges and/or an interpretative comment. Advice on appropriate requesting and interpretation of results is available at all times from the Chemical Pathologists and Clinical Biochemists.

For full referral address refer to Appendix 1 (Blood sciences)

Test	Sample	Reference range	Referral site	Comments	Turnaround Time
Aciclovir	Serum (brown)		AML		1 -2 weeks
CSF Glucose	CSF collected into fluoride oxalate (grey)	2.2-3.9mmol/L			<1 hours
β-Trace Protein	Fluid from nose or ear	>2.0mg/L suggests presence of CSF >6.0mg/L strongly suggests CSF presence.	ADI		<5 days
Beta trace (also known as prostaglandin D synthetase) is a protein found at high concentration in csf (20mg/L) and low concentration in normal serum (0.5 mg/L). Its measurement is useful in patients with otorrheoa or rhinorrhoea to identify the presence of CSF.					
β-D-glucan	Serum (brown)				<2 weeks
CSF oligoclonal bands	CSF plain tube + clotted blood (Brown)	Interpretation with report	ION	Send paired serum sample	2 -3 weeks
CSF amino acids *includes glycine, serine*	Plain container 0.2mL	Interpretation with report	ION	Avoid contamination with blood. Send fresh sample promptly to Laboratory. Send plasma for amino acids at same time.	<2 weeks
This test should be performed with a paired plasma sample and an increase in CSF: plasma glycine is seen in glycine encephalopathy. Elevated CSF serine, threonine and glycine may also indicate disturbance in B6 metabolism.					
CSF Angiotensin Converting Enzyme (ACE)		5 – 12 µmol/L	ION		4 weeks
CSF lactate	Fluoride (grey)			Send blood sample for glucose and lactate at same time	<1 hours

Test	Sample	Reference range	Referral site	Comments	Turnaround Time
CSF neurotransmitters *includes monoamine metabolites, 5-methyl tetrahydrofolate, pterins, pyridoxal phosphate*	Not available locally	Interpretation with report	ION		
CSF protein	CSF plain tube	0.15-0.45 g/L		Invalidated by any detectable blood	<1 hours
CSF Xanthochromia	CSF plain tube	Interpretation with report	ION		1 weeks
Daptomycin	Serum (brown)		AML		1 -2 weeks
Dialysis fluid HCO3	Dialysis fluid				<3 wday
Dialysis fluid Calcium	Dialysis fluid				<3 day
Dialysis fluid Creatinine	Dialysis fluid				<3 day
Dialysis fluid glucose	Dialysis fluid				<3 day
Dialysis fluid lactate	Dialysis fluid (grey)				<3 day
Dialysis fluid potassium	Dialysis fluid				<3 day
Dialysis fluid protein	Dialysis fluid				<3 day
Dialysis fluid sodium	Dialysis fluid				<3 day
Dialysis fluid urea	Dialysis fluid				<3 day
Ethambutol	Serum (brown)		AML		1 -2 weeks
Faecal alpha-1 anti-trypsin	Random faecal specimen	0-0.48 mg/gww (mg per gram wet weight of faeces)	SGP	Sample must be fresh and frozen on receipt (within 24h of collection).	2 weeks
This test is used as a guide to the extent of protein loss into the gut in suspected protein-losing enteropathy. Clinicians should first exclude urinary losses using urinary protein/creatinine ratio					
Faecal calprotectin	Random faecal specimen	0-50	ADH	Store (2-8ºC)before sending stable for 6 days before testing. DO NOT FREEZE	2-3 weeks
Faecal elastase	Random faecal specimen	>200ug/g	ADI	For pancreatic insufficiency	2 -3 weeks

Test	Sample	Reference range	Referral site	Comments	Turnaround Time
Faecal Porphyrins	Random specimen. Must be fresh and protected from light.	Interpretation with report	BED	For detection of porphyrias with non-acute presentation. Blood and urine samples also required.	4 -6 weeks
Faecal reducing substances	Fresh random specimen	None detected	GOSH		On discussion with biochemistry consultant .
Fluid pH	Pleural/ascitic fluid collected anaerobically in a heparinised syringe (blood gas syringe) Sample must be analysed within an hour of sample collection.			Must be hand delivered to the lab. DO NOT USE CHUTE	< 1 day
Ganciclovir	Serum (brown)		AML		1 -2 weeks
Isoniazid	Uncentrifuged (Yellow)	3-5mg/L	AML		1 -2 weeks
Posaconazole	Serum in plain clotted tube (white)	Prophylaxis: Pre 0.7-3.75mg/L. Therapy: Pre 1.0 -3.75mg/L. All Pre dose levels to be kept below 3.75mg/L	AML		1 -2 weeks
Rifabutin	Serum (brown)		AML		1 -2 weeks
Rifampicin	Serum (brown)		AML		1 -2 weeks
Stone analysis	Stone	Interpretation with report	UCLH		1 -2 weeks
Streptomycin	Serum (brown)		AML		1 -2 weeks
Trimethoprim	Serum (brown)		AML		1 -2 weeks
Sulphamethoxazole	Serum (brown)		AML		1 -2 weeks
Voriconazole	Serum in plain clotted tube (white)	Prophylaxis and therapy – Pre dose 1.0-5.5mg/L or 2.0-5.5 mg/L for bulky or disseminated infections	AML		1 -2 weeks

12. Specialist metabolic blood tests

Indicative turnaround times are given for non-urgent situations. It may be possible to expedite results by discussing the clinical situation with the Laboratory Consultant staff.

If a required test is not listed here, please discuss with the Laboratory Consultant staff.

Test	Sample	Comments	Turnround
Acetoacetate	Not available locally		
Acylcarnitines	4 dried blood spots (Guthrie card)	Clearly write "acyl carnitines) on the card. Allow to air-dry, then place in glassine sleeve and send to Laboratory. Do not post to Newborn Screening Laboratory.	<2 weeks
Amino acids *includes homocysteine, glycine, serine*	Heparin (Orange) 1mL	Avoid haemolysis. Send sample to Laboratory within 30 minutes.	2 weeks
Ammonia	EDTA (red) 1mL	Inform Laboratory. Avoid haemolysis. Take to laboratory immediately. Within 15 minutes.	3 hours
β-hydroxybutyrate	Heparin (Orange) 0.5mL	Send sample to Laboratory within 30 minutes. Send sample for glucose at same time.	1 week
Biotinidase	Heparin (Orange) 0.5mL	Avoid haemolysis. Send sample to Laboratory within 30 minutes.	<2 weeks
C-peptide	Clotted (red or Brown) preferred Heparin (Orange) also acceptable 0.5mL	Send sample to Laboratory within 30 minutes. Send sample for glucose at same time. Please note adult and paediatric samples are sent to differing locations	1 weeks
7-dehydro-cholesterol	Heparin (Orange) 1mL	Requests are easily misinterpreted as cholesterol. To avoid this, please alert Laboratory before sending	8 weeks
Free fatty acids	Heparin (Orange) 0.5mL	Send sample to Laboratory within 30 minutes. Send sample for glucose at same time.	1-2 weeks
α-galactosidase	EDTA (Red) 5mL	Send straight to the lab. For Fabry disease in males and females. Confirmation testing for	5 weeks

Test	Sample	Comments	Turnround
		females follows the rare and inherited diseases - molecular genetics pathway (GEN1 on ICE)	
α-glucosidase (acid maltase)	EDTA (Red) 2mL	For Pompe disease (Glycogen Storage Disease Type II)	5 weeks
Gal-1-PUT	Heparin (Orange) 2mL	Contact Laboratory to arrange: needs rapid transport to another Laboratory. Do not collect if transfusion in previous 6 weeks	4 weeks
Insulin	Clotted (red or Brown) preferred Heparin (Orange) also acceptable 0.5mL	Avoid haemolysis. Send sample to Laboratory within 30 minutes. Send sample for glucose at same time.	2 weeks
Lactate	Fluoride (grey) 1mL	Request glucose on same sample	3 hours
Pyruvate	Not available locally		
Transferrin glycoforms	Heparin (Orange) or clotted (red or Brown) 0.5mL		10 days
Ubiquinone	EDTA (Red) 5-10mL	Contact Laboratory to arrange: needs rapid transport to another Laboratory	4 weeks
Vacuolated lymphocytes	EDTA (Red) 2mL	Contact Laboratory to arrange: needs rapid transport to another Laboratory. For lysosomal storage disorders	Not stated
VLCFA (very long chain fatty acids) *Includes phytanate and pristanate*	Heparin (Orange) 1mL	Fasting sample preferred. Send sample to Laboratory within 30 minutes.	2-4weeks
White cell enzymes	Heparin (Orange) 5-10mL	Contact Laboratory to arrange: needs rapid transport to another Laboratory. Full clinical details must be given.	6-8 weeks

Specialist metabolic Urine investigations

Indicative turnround times are given for non-urgent situations. It may be possible to expedite results by discussing the clinical situation with the Laboratory Consultant staff.

If a required test is not listed here, please discuss with the laboratory consultant staff.

Test	Sample	Comments	Turnaround
Urine amino acids	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	<2 weeks
Urine mucopolysaccharides (glycosaminoglycans)	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	6-8 weeks
Urine organic acids	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	3 weeks
Urine purines and pyrimidines	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	Not stated
Urine sulphite	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	1 week
Urine sulphocysteine	Random urine, plain container 5mL	Send fresh sample promptly to Laboratory	3 weeks

Specialist metabolic CSF tests

Indicative turnaround times are given for non-urgent situations. It may be possible to expedite results by discussing the clinical situation with the Laboratory Consultant staff.

If a required test is not listed here, please discuss with the Laboratory Consultant staff.

Test	Sample	Comments	Turnaround
CSF amino acids *includes glycine, serine*	Plain container 0.2mL	Avoid contamination with blood. Send fresh sample promptly to Laboratory. Send plasma for amino acids at same time.	2 weeks
CSF lactate	Fluoride (grey)	Request glucose on same sample. Send blood sample for glucose and lactate at same time	3 hours
CSF neurotransmitters *includes monoamine metabolites, 5-methyl tetrahydrofolate, pterins, pyridoxal phosphate*	Not available locally		

13. Requesting genetic tests in East & North Herts NHS Trust

The NHS Genomic Medicine Service has improved access to genomic testing and standardised requesting processes through a network of Genomics Hubs. Funding for our patients is provided centrally to our local Genomics Hub Laboratory (East Genomic Laboratory Hub, located in Cambridge) and all blood samples for genomics tests must be sent there.

Requesters are advised to familiarise themselves with the "Rare and inherited disease eligibility criteria" (visit https://www.england.nhs.uk/publication/national-genomic-test-directories/) before making requests.

The reporting time guideline for most of this service is 6 weeks (42 days). For further guidance, see https://www.eastgenomics.nhs.uk/about-us/quality/nhse-test-directory-turnaround-times/

Requests from this Trust must be made using our ICE Ordercomms system:

If you have been using paper genomics request forms published by other laboratories (eg. Great Ormond Street, Royal Brompton, etc), please stop this practice as it causes confusion over the location of the requester.

1. In the search panel on ICE, type in "rare". For Molecular Genetics tests (DNA tests, and microarray – EDTA blood sample) choose the option ending in ***Mol***. For Cytogenetics tests (chromosome tests such as karyotype, FISH, X-inactivation testing - heparin blood sample) choose the option ending in ***Cyto***.
2. Confirm that you have discussed genomic testing with the patient and retained a record in the notes (tick ***yes*** or ***no***)
3. State exactly the test required (if possible give the relevant R code from "Rare and inherited disease eligibility criteria"), and give a full description of the clinical indication including results of related tests, index case identifiers etc. This is a free-text box that will expand as you type. Pedigree diagrams cannot be entered on ICE - please attach on a separate piece of paper if relevant.
4. Select the type of test required from the drop-down menu (diagnostic, predictive, carrier, or DNA storage only).
5. Enter your email address so that the Genomics Hub can contact you for further information if required.
6. Click OK.

There are optional links that you can follow from ICE to the National Genomic Test Directory for Rare and Inherited Disease, or to the genomics hub's guidance on consent.

Results will be reported on ICE.

Requests by Genetic Counsellors made on behalf of this Trust:

If you are requesting from an off-site location, you may not have access to ICE requesting. In this case, please continue to use your previous paper request forms, or the forms from the East Genomics Hub, observing the following:

- Type your entries if possible, or take great care to ensure full legibility.
- State the blood tube type required (EDTA or heparin, or both), if that is not otherwise clearly on the form, otherwise the Phlebotomist may not be able to collect the blood for you.
- State the R-code as well as other clinical information as this speeds the flow through the Genomics Hub Lab.
- Be sure to state your name and email address, and make it clear that you are operating from either the Lister Hospital OPD, North-West Thames Genetics Service, or Northwick Park Hospital.

Results will be reported on ICE.

Questions or problems:

If you experience any problems or have any queries or suggestions regarding the local part of the requesting process, please contact either: angelawoods@nhs.net or enhtr.iceocs@nhs.net.

14. Haematology

Haem
atology is part of Blood Sciences department.

Opening hours

Monday to Friday: 09:00 - 17:00.
At all other times contact the Biomedical Scientist on call for urgent work only.
Bleep 1005

General Queries: 01438 284961

Key contacts

Consultant haematologists
Dr J Hanslip judith.hanslip@nhs.net 01438 285375 (Ext 5375)
Dr Xenofon Papanikolaou xenofon.papanikolaou@nhs.net 01438 284159 (Ext4159)
Dr Muhammad Hasan muhammad.hasan1@nhs.net 01438 281610 (Ext1610)
General Manager for Diagnostics and Haematology
Laarni Calonzo l.calonzo@nhs.net 01438 285225 (Ext 5225)

Results

The Sunquest ICE system should be used to look for results. In the event that this is not possible the results line should be contacted on 01438 285461 (Ext 5461).

Critical results - these apply to acute work only,

Results outside the limits below will be telephoned urgently to the requesting clinician.

- Results from a positive malarial parasite screen.
- ALL SIGNIFICANTLY ABNORMAL RESULTS, whether urgent or not must be telephoned to the requesting clinician unless previous results, already reported, have been similar (+/- 10 %).

Test	Units	Critical Low	Critical High
WBC	x 10^9L	< 1.0	> 50.0
Neutrophils	x 10^9L	< 0.5	> 50.0
Lymphocytes	x 10^9L (adult)		> 50.0
Hb	g/L	<70 Normchromic,or<50 Macro or Micro-Cytic	> 190
Platelets	x10^9L	<30 *	>1000
INR (warfarin pts)	Ratio		>6.0
APTT Ratio	Ratio		>3.0
PT	Seconds		>20
APTT	Seconds		>60
Fibrinogen	g/L	<1.2	
DDimer	ng/mL		>3000ng/ml
ESR	mm/hour		**>80** (with symptoms such as headache, giant cell arteritis or temporal arteritis)

Specimens and tests - tests marked * in the table below have an expected completion time of <1 hour from receipt in lab if requested urgently from A/E.
Sample volumes 2ml EDTA or 5ml Citrate unless otherwise stated.

Test	Sample	Reference range	Comments/referral site	Turnaround
ANEP	EDTA (Red)		Haemoglobinopathy screens performed as part of the Antenatal haemoglobinopathy screening programme must be accompanied by a completed Familly Origin Questionaire. Abnormals are referred to Addenbrookes Hospital	<3 days
Full Blood Count *	EDTA (Red)	**WBC** 4-11.0 10^9/L **HB** Female 115-160 **g/L** Male 130-170 **g/L** **Platelets** 150-400 10^9/L		<8 hours
Haematologist Film Comment	EDTA (Red)			24 - 48 hours Urgently as required.
Erythrocyte Sedimentation Rate (ESR) *Urgent TAT 2hrs (analysis takes 1hr)	Citrate (Purple)	Male <50 yr 1-10 50-60 yr 1-12 60-70 yr 1-14 >70 yr 1-30 Female <50 yr 1-19 50-60 yr 1-19 60-70 yr 1-20 >70 yr 1-35	Exact quantity of blood required – allow blood to fill vacuum.	<8 hours
Reticulocyte count	EDTA (Red)	30-90 10^9/L		<8 hours
Infectious Mononucleosis Test (glandular fever)	EDTA (Red) and a clotted sample			<24 hours
Malarial Screen * Includes blood film and immuno test	EDTA (Red)	If both results are negative but malaria suspected clinically, sample should be repeated 2-3 times at 8-12h intervals. (Note that immuno test may not detect P. knowlesi)		<4 hrs

Test	Sample	Reference range	Comments/referral site	
Haemoglobinopathy Screen	EDTA (Red)		Haemoglobinopathy screens performed as part of the Antenatal haemoglobinopathy screening programme must be accompanied by a completed Familly Origin Questionaire. Abnormals are referred to Addenbrookes Hospital	<3 days
Sickle screen*	EDTA (Red)		Confirmed by Haemoglobinopathy screen. For confrmation please request haemglobinopathy screen on ICE. HBEP (non antenatal) or ANEP (antenatal)	<4 hours
Clotting screen PT APTT Fibrinogen (Fib)	Citrate (Green)	PT 9-12 secs APTT 22-28 secs Fib 2-4g/L	PT, APTT and Clauss fibrinogen performed on all coagulation screens. Fill sample tube to mark.	< 8 hours
INR (oral anticoagulant control)*	Citrate (Green)	Patient specific therapeutic range	Fill sample tube to mark.	< 8 hours
D-Dimer*	Citrate (Green)	0-500 ng/ml	Fill sample tube to mark.	< 4 hours
'Thrombophilia' screens. Lupus Anticoagulant	Citrate (Green x4) 5 ml	Refer to report for result interpretation	Please see guidelines on appropriate testing.	2-3 weeks

Test	Sample	Reference range	Comments/referral site	Turnaround
Haematinics, B12, serum folate,(FOLF/FOLS) ferritin (FER)	EDTA (Red) and a clotted sample (for serum folate a 12hr fast is recommended, but not essential	**B12** 200-770ng/L **Serum Folate*** >4.5 µg/L <3 µg/L is indicative of folate deficiency **FER** Male 30-400-ug/L Female 13-150ug/L	B12 guidance no sample should be collected from a patient who has received Vit B12 injection therapy within the past week *A folate rich meal taken 3hours before venesection may increase serum folate concentration Age related references reportable.	<3 days
Factor V Leiden	Citrate (Green)		Referred to NOT	7 days
Coagulation Factor Assays	Citrate (Green)	See report for interpretation	Referred to Addenbrookes	<72 hrs
Anti-Xa assay	Citrate (Green)		Requires prior discussion with Haematology Consultant	
Apixaban Anti Xa	Citrate (Green)		Referred Addenbrookes	
Edoxaban Anti Xa	Citrate (Green)		Referred Addenbrookes	
Rivaroxaban Anti Xa	Citrate (Green)		Referred Addenbrookes	
Von Willebrands factor	Citrate (Green)		Referred Addenbrookes	3 days
G-6-PD screen	EDTA (Red)		If deficient sent to HSL	<48 hrs
Haemochromatosis	Crossmatch tube (blue)		Referred to CUH	6 weeks
Haemosiderin	Urine			2 days
SPECIAL HAEMATOLOGY Bone Marrow Aspirates and Trephine Biopsies Schilling tests	Discuss with Consultant Haematologist			

Test	Sample	Reference range	Comments/referral site	Turnaround
Immunophenotyping Molecular tests Jak 2	Crossmatch tube x2 (blue)	Refer to report for result interpretation	Referred to SIHMDS/UCLH	2 Weeks
BCR/ABL	Crossmatch tube x2 (blue)	Refer to report for result interpretation	Two sample tubes Referred to SIHMDS/UCLH for screening.	2 weeks
Cytogenetics	Li Heparin (Orange no gel) and EDTA (Red)	Refer to report for result interpretation	Referred to Kennedy Galton	2 weeks

NB: All requests for Paediatric (<17 years) Haematopathology and Oncology Diagnostic patient are to be sent to HODS in Addenbrooke's Hospital.
Samples should preferably arrive in the HODS CUH lab before 4 pm Monday to Friday.
All samples arriving after standard working hours should be notified to the laboratory where possible within working hours.

The laboratory must be notified by telephone of all cases that are deemed clinically urgent.

If urgent morphology or immunophenotyping is needed outside of working hours, please contact the on-call HODS consultant via Cambridge University Hospital switchboard on (01223) 245151.

15. Blood transfusion

Blood Transfusion is part of Blood Sciences department.

General enquiries Lister 01438 285245

Opening hours
Lister Monday to Friday: 9:00 - 17:00
At all other times contact the Biomedical Scientist on call for urgent work
Lister Bleep 1005

Key contacts:
Consultant Haematologist & Clincial lead
Dr M Xenofon Papanikolaou xenofon.papanikolaou@nhs.net 01438 284146 (Ext 4146)
Bleep 5922

Pathology Services Manager
Kate Barrett katebarrett@nhs.net 01438 285225 (Ext 5225)

Transfusion Lead Biomedical Scientist
Jane Tidman - j.tidman@nhs.net 01438 2844295 (EXT 4295)

Specialist Practitioners of Transfusion
Mrs S Needham sheila.needham@nhs.net 01438 288016 (Ext 8016 or 8017)

Mrs K Baylis karen.baylis@nhs.net 01438 288017 (Ext 8016 or 8017)

Mrs J Edmonds julie.edmonds@nhs.net 01438 288016 (Ext 8016 or 8017)

Specimens and tests

All staff involved with the collection of blood samples for the transfusion laboratory or with the transportation /administration of blood products must undergo training and competency assessment in order to comply with the requirements of the National Patient Safety Advice SPN14.

All samples (4.9ml Blue EDTA tubes) and request forms for the blood transfusion laboratory must be labelled with four points of identification;-

1. NHS Number
2. Surname
3. First name
4. Date of birth
5. Hospital number

Details on sample tubes must be hand written and the tube signed by the venesector. All details on the tube must be identical to those on the form and corroborate with the patients wristband and clinical notes. Any sample/request form that has incomplete or discrepant labelling will not be processed.

Blood Group and Antibody Screen (Antenatal)

Clinically significant antibodies in pregnancy are monitored in conjunction with the National Blood Service and are brought to the attention of the Consultant Haematologist for appropriate action.

Blood group and antibody screen (group and save)

This Trust operates a two sample policy. Before cross-matched blood can be provided there has to be at least two group results available for the patient. These samples must be taken on two separate occasions at

least 15 minutes apart. Timely provision of compatible blood can be expedited much more effectively when a request for a group and antibody screen is sent with sufficient notice to allow the identification of any clinically significant antibodies that may be present. Where any clinically significant antibodies are detected a delay in the provision of compatible blood may be unavoidable. Turnaround time for routine group and save is 24 hours

Regularly transfused patients

Many Regularly Transfused Patients have complex special requirements that necessitate their blood being prepared at Colindale Blood Transfusion Centre. Once Colindale has issued compatible blood it is only valid for use for 72 hours from the time the sample was taken. Others require blood to be ordered in specifically to meet their needs. In order to ensure we have blood available for these patients we need to receive the requests and samples for all regularly transfused patients 48 hours prior to the scheduled transfusion time.

Cross matching

Compatible blood is provided for all patients needing transfusion. For routine blood transfusion the same day, cross-match samples must be received in the laboratory by 13:00 hours. In the case of elective surgery please refer to the Maximum Surgical Blood Ordering Schedule when deciding which request to make for a particular operation. The Schedule is included in the Junior Doctors' induction pack and available on the Trust intranet. It is essential to provide the nature, date and time of the proposed surgery on the request form. Please discuss variations from the schedule with the laboratory. A blood group and antibody screen should be ordered at the out-patient appointment or at the pre-admission clinic visit. There needs to be a repeat sample taken within the week of the scheduled surgery, with any request for crossmatching, to ensure a valid sample is available. Where blood provided to cover an operation is not used, it will be reclaimed the following morning without notice unless prior arrangements have been made with the Transfusion Laboratory.
Requests for the rapid provision of blood must be telephoned to the laboratory. If the criteria for Electronic Issue are met blood can be made available in 10 minutes providing there is a valid group and save. When serological cross-match is required the minimum turn around time is 1 hour depending on any antibodies detected, with a valid group and save already in the laboratory.

Blood transfusion policy

A comprehensive set of Blood Transfusion Policies are available in all clinical areas and on the Hospital Intranet / Knowledge Centre. It covers all aspects of requesting and the administration of blood and blood components, and is applicable to all hospitals in East and North Herts NHS Trust.
Fresh Frozen Plasma (FFP), Cryoprecipitate and Platelet concentrates can be ordered directly from the laboratory. Routine orders for Platelets must be made before 10.30am. Clotting Factor concentrates can be ordered after discussion with a Consultant Haematologist.

Advice and interpretation of results

The Consultant Haematologists are available to advise users on how to use the Laboratory most effectively. They are happy to discuss the best way to investigate a specific clinical problem, to comment on abnormal results and to make suggestions regarding further investigation, if required.
Comments may be sent out, as an addendum to the Laboratory report but in complex or urgent situations a telephone call will be initiated by either the Consultant Haematologist or the user.

BT Send away Tests

Description	Form	Destination	Codes
Adult Autoimmune Neutropenia	3E	Filton	AAIN
Antibody Identification	1A	RCI Colindale	ABID
Anti A_1 and B Titre	1A	RCI Colindale	ABTR
Antibody Titre	1A	RCI Colindale	TITR
Autoimmune Thrombocytopenia	3D	Filton	AIT
Blood Group Confirmation	1A	RCI Colindale	BGCN
Crossmatch Components	1A	RCI Colindale	XMC
Drug Related Thrombocytopenia	3E	Filton	DRT
Drug Related Neutropenia	3E	Filton	DREN
Fetal/ Neonatal Alloimmune Thrombocytopenia	3D	Filton	NAIT
Flow Cytometry	1A	RCI Colindale	FCC
Heparin Induced PLT Antibodies	3D	Filton	HIPA
HFE/ Haemochromotosis	3A	H&I Colindale	HFE
HLA Testing for Narcolepsy	3A	H&I Colindale	NAR
HLA ABC Typing (HLA Type)	3A	H&I Colindale	ABC
HLA B27	3A	H&I Colindale	B27
HLA B*57:01	3A	H&I Colindale	5701
HLA DR Typing	3A	H&I Colindale	DR
HPA Type	3A	H&I Colindale	HPAT
HNA Type	3A	H&I Colindale	HNAT
HLA Antibody Screen	3A	H&I Colindale	HLAS
HPA Antibody Screen	3A	H&I Colindale	HPAS
HNA Antibody Screen	3A	H&I Colindale	HNAS
Investigation of Platelet Refractoriness	3D	H&I Colindale	IPR
Infant Autoimmune Neutropenia	3E	Filton	IAIN
Neonatal Alloimmune Neutropenia	3E	Filton	NAIN
Neutrophil Antibodies	3E	Filton	NEUA
Rh D confirmation	1A	RCI Colindale	DVAR
Post Transfusion Purpura	3A	Filton	PTP
Severe febrile non-haemolytic transfusion reaction	3A	H&I Colindale	SFTR
Transfusion-Related Acute Lung Injury	3A	H&I Colindale	TRAL
Transfusion-associated graft versus host disease	3A	H&I Colindale	TAGD
Foetal RHD Screen	FRH5197/3	Filton	FDNA

16. Immunology

Most Immunology requests are referred to Cambridge University Hospital.
A Consultant Immunologist (Dr Scott Pereira) is employed by ENHT and is available for advice.

Key contacts

Consultant immunologist:

Dr Scott Pereira	scott.pereira@nhs.net	01438 284959 (Ext 4959)
Victoria Barnard	victoria.barnard@addnebrookes.nhs.uk	01223 254947

Results: all results are available on ICE system

For detailed information on this discipline and tests, see the up to date Blood Sciences handbook via the link below

Addenbrookes Blood Sciences Handbook

High Risk samples must be identified on ICE by ticking the relevant box. Samples must have a HIGH RISK label attached.

Immunology sample requirements

Serum Samples
Most tests are performed on serum separated at room temperature. The exceptions are listed below. For serum, blood should be collected in a plain brown top gel tube with no anticoagulant.

Allergy testing
The specific allergen required must be clearly stated.
Where mixes of multiple varieties are available, they will be used unless a specific allergen is requested e.g. Grass mix performed, unless 'Timothy grass' is specified.
If the request is unclear Immunology at CUH may perform general food allergy testing, although it cannot accept responsibility for any choices made.
A request for Aspergillus will receive IgE, unless IgG Aspergillus is clearly stated.
If total IgE measurement is required, it must be clearly requested.

Lymphocyte Phenotyping Studies
These are performed on a 2.7 ml EDTA (Monovette) sample

Neutrophil Function Studies
Neutrophil oxidative burst DHR tests are performed on a 2.7 ml EDTA (Monovette) sample taken *directly* to the laboratory or transported to arrive in the laboratory within 4 hours of collection, along with a control sample. Neutrophil tests are time consuming, and can only be done on Monday to Friday if received before 2.00 pm.

Quantiferon TB Gold (Interferon gamma release assay-IGRA)
Adults and children: 1ml of blood must be drawn directly into each of the four QuantiFERON-GOLD Plus tubes in order, which must be all labelled with appropriate patient identifying information.
(1) Nil control (GREY TOP)
(2) TB 1 Antigen (GREEN TOP)
(3) TB Antigen 2 (YELLOW TOP)
(4) Mitogen Control (PURPLE CAP)
(Collection tubes available from Phlebotomy and directly from the Immunology laboratory)

Samples must be incubated at 37o c within 16 hrs of collection at CUH, and must be kept at room temperature prior to this. Please contact the laboratory for further information if requesting test from non-Addenbrookes locations. Samples must be received into the laboratory by 6pm Friday for processing. Samples received after this time will not be tested.

Cytokine studies

Please send from Patient and from a healthy control:
5-10 ml Li-heparin blood (3 ml from very small children)
2.7 ml Edta-blood
1-2 ml Serum/clotted (not for very small children)

Cryoglobulins

If cryoglobulins are suspected in autoimmune rheumatoid disorders, a 10 ml blood sample should be collected in a *pre-warmed* plain white Monovette tube and placed immediately into a vacuum flask
Contact the laboratory for assistance.
Requestors should be aware of the testing protocol before contacting laboratory.

Immunoglobulins

Routine tests for total serum IgG, IgA and IgM are performed in the Clinical Biochemistry. Tests for IgG subclasses, IgE, and very low immuno-globulins in hypogammaglobulinaemia are performed in the Clinical Immunology laboratory.

Beta Trace protein (Tau)

Samples for Beta Trace protein (Tau) which are 'fluid' thought to be CSF (from nose or ear). They can be collected in universal containers or small sample tubes with no gel/preservative

Urine

Requests for Bence Jones protein require a 20ml aliquot of urine in a universal container (NO preservative).

17. Microbiology

These notes are provided for clinical staff using the microbiology laboratory; they are not intended to be a complete or authoritative document but merely a guide to some of the services available. If you need further information about specimens, availability or suitability of tests, interpretation of results, or any other matter relating to the microbiology service, phone the department - staff will be pleased to help.

The microbiology laboratory is centralised at the Partnership's Cambridge hub at CUH. For detailed information refer to the Cambridge Microbiology Handbook. Click on Link:

https://gpconnect.addenbrookes.nhs.uk/media/13052/Microbiology-Handbook/pdf/User_Handbook_PHE_Clinical_Microbiology_Service_Cambridge_Jan22

Key contacts

Lead Clinician

Dr Eleni Mavrogiorgou elenimavrogiorgou@nhs.net direct line 01438 284288 (Ext 4288)
Secretary direct line 01438 284043 (ext 4043)

General manager for diagnostics

Laarni Calonzo l.calonzo@nhs.net direct line 01438 2845225 (Ext 5225)

Microbiology Team:

Microbiology Consultants		Secretary
Dr Saba Qaiser (Locum) saba.qaiser@nhs.net	01438 284578 (ext 4578)	direct line 01438 284043 (ext 4043)
Dr Zoi Foka (Locum Consultant) zoi.foka2@nhs.net	01438 2844047 (ext 4047)	direct line 01438 284043 (ext 4043)
4th Consultant(vacant post)		
The Pathology service desk – Monday –Friday 8am to 6pm. For queries of results or tests performed at CUH		0333 103 2220 pathp.servicedesk@nhs.net
Infection Control Nurses		Bleep 5383 Bleep 0526/0525
Clinical microbiology advice line		07500 975834 or e-mail microbiologyadvice.enh-tr@nhs.net
Infection Control queries		01438 285383 infectionprevention.enh-tr@nhs.net
Urgent out of hours (5pm to 9 am Monday to Friday, weekends and Bank Holidays) clinical microbiological and/or infection control advice		On call Consultant via switchboard
Urgent out of hours requests		Biomedical Scientist at CUHFT on call via switchboard

See below Micro Checklist before seeking advice from a Consultant;

Microbiology referral checklist
The on-call microbiology consultant can be contacted via switchboard.
Please know your patient well and seek senior advice prior to contacting microbiology.
Before contacting microbiology, please ensure you have the following information at hand in addition to your query:
1. Patient name
2. Age
3. NHS number
4. Ward
5. Consultant
6. Allergies (including nature of allergy)
7. Any relevant past medical history (including any previous relevant infections)
8. Day of admission
9. Presenting complain/ infection at hand
10. Current antibiotics
11. Previous antibiotics (for this infection)
12. Blood tests and blood cultures
13. Any relevant imaging results (e.g. cardiac echo)
14. Renal function/ modality
15. Discharge plan if relevant
16. Name and bleep number

Specimens should be left at pathology reception and these will be transported to CUHFT. During normal working hours you must ensure the laboratory is informed by telephone of any urgent specimens and that the specimens are labelled 'URGENT'.

Opening hours
Monday to Friday: 09.00 – 17.00
The department is situated in the Pathology Department, Level 3 at Lister Hospital, Coreys mill lane, Stevenage SG1 4AB

Specimen containers and swabs - All available from either Microbiology or Pathology Reception

- Swabs for bacterial culture (Plain sterile universal container
- Per-nasal swabs
- Blood culture bottle collection sets (and instructions)
- Red top Universal containers (Urine pots)
- Sputum containers
- Green top Universal Faeces containers
- Swabs for viral culture (Orange-topped)
- *Chlamydia trachomatis* detection kits (NAAT)
- Slides for the diagnosis of eye infections due to *Chlamydia trachomatis*
- Threadworm investigation kit (and instruction leaflets)
- Blood collection bottles (Red/Yellow top SST GEL- serum)
- Blood collection bottles (Paediatric Red top - serum)
- Blood collection bottles (Purple top EDTA- plasma)

Without the full information detailed above, it is impossible to examine a specimen or to accurately report it.
For minimum acceptance criteria for making pathology requests see Pathology Appendix 2- Trust Policy for Pathology Sample Collection.

All specimens must be labelled using the pull off labels from the Sunquest ICE request form, and the date, time of collection and location of the patient noted on the specimen. Incorrectly labelled specimens will normally be discarded. The container should be firmly closed and carefully sealed in the sealable pocket of the specimen bag with the request card in the outer non-sealable pocket.

Health and safety
The laboratory should be alerted to the potential infection risks from any patient sample by inclusion of sufficient clinical information. High risk stickers should be placed on the samples of patients suspected of having a hazard group 3 or 4 organism. Samples suspected of containing hazard group 4 organisms should not be sent to the laboratory without prior discussion with a consultant Microbiologist.

Important information regarding MRSA screens

MRSA screens are cultured on selective media on which other potential pathogens will not grow. Therefore if there are signs of infection at a wound site, you MUST send a wound swab for full culture, not just as a MRSA screen.

MRSA screens will NOT be processed unless they are ordered on Sunquest ICE.
For more details on MRSA screening refer to the Trust MRSA Policy

Specimen collection

Whenever possible specimens should be collected prior to antimicrobial therapy and promptly delivered to the laboratory. Remember to inform the laboratory about any urgent specimens that you are intending to send during normal working hours (refer to Microbiology Pathology handbook).

The laboratory cannot process specimens or interpret the result accurately without suitable and sufficient clinical information. The quality and integrity of the sample is the responsibility of the person collecting the sample. The sample may deteriorate if there is any delay in delivery to the laboratory or if the sample has not been stored incorrectly before delivery.
The laboratory will endeavour to provide the best possible service but the quality of the results ultimately depends on the quality of the sample submitted for testing.

Covid-19 PCR testing

The bulk of the Trust's Covid-19 PCR testing is performed by Microbiology at Cambridge, but a there is a small amount of capacity for more rapid testing at Lister as Covid-19 PCR test (POCT). Please follow the Trust's current guidance (see Daily Brief) on these pathways.
Please answer the questions appropriately when making ICE requests as this will direct samples either to this low capacity rapid pathway or to the high process provided from Cambridge. Tests required on nasopharyngeal aspirates or other fluids must be processed at Cambridge

18. Histopathology

Key contacts

Lead Clinician

Dr Samita Agarwal direct line 01438 288031 (ext8031)
Secretary direct line 01438 284048 (ext4048)

Consultant Histopathologists:

Consultants:		**Secretary**
Dr A Narula	01438 286326 (ext 6326)	01438 288040 (ext 8040)
Dr W Mohamid	01438 285279 (ext 5279)	01438 286074 (ext 6074)
Dr S Agarwal	01438 288031(ext 8031)	01438 284048(ext 4048)
Dr S Angra	01438 286165(ext 6165)	01438 286124(ext 6124)
Dr K Adu-Poku	01438 286181(ext 6181)	01438 288042(ext 8042)
Dr L Mears	01438 284592(ext 4592)	01438 288041(ext 8041)
Dr R Swamy	01438 284158(ext 4158)	01438 285708(ext 5708)
Dr Y Thevacumar	01438 285282(ext 5282)	01438 288043(ext 8043)
Trust Fellow		
Amali Albert		
Dr Manika Khare		
Dr Deepshikha Gaire		

Laboratory Manager:

Rachel Smith : 01438 285840 (ext 5840)
Email: r.smith96@nhs.net

General Queries & Results:

Office	01438 288043 (ext 8043)
Histology Laboratory	01438 288044 (ext 8044) 01438 285198 (ext 5198)
Cytology Laboratory	01438 285913 (ext 5913)

MDT Coordinators:

Aneta Chojmaka	01438 286182 (ext 6182)
Kelly O'Reilly	01438 286182 (ext 6182)

Opening hours

Monday to Friday: 08.30 – 17.00

The department is situated in the Pathology Department, Level 3 at Lister Hospital, Coreys mill lane, Stevenage SG1 4AB

Specimens and tests

Request Form:

Cellular Pathology requests can now be raised using Sunquest ICE and samples labelled with the printed barcodes. Addressograph labels with all the patient's identifiable details on will be accepted aswell as hand written request forms but they **must** be legible and must have a minimum of **three** patient identifiable features. These are:

a) Patients Surname and Forename
b) Patients Date of Birth
c) NHS number (10-digit number ***-***-****)
d) Hospital number
e) Patients Address

Request forms should also be filled in legibly with the following details:

a) Requesting source/location (i.e. GP surgery, ward, out-patients, etc)
b) Requesting Consultant or GP
c) Nature of the specimen/site of specimen
d) Signature
e) Bleep/Contact number
f) Brief clinical details

This information is vital to the correct interpretation of the test material and for ensuring that results are sent to the appropriate location. Please also include an extension or bleep number, particularly for urgent samples.
ICE requesting is strongly encouraged however request forms are available from main pathology (ext. 5232).

Histology Samples:

Sample containers should ideally be labelled with the ICE barcode sticker. It *must* be labelled with at least 3 identifiers – Surname, forename, DOB and/or NHS number.
If more than one sample is collected for a patient each sample should e clearly referenced on the request form.

Fixation

Small endoscopic or needle biopsies can be satisfactorily fixed in 2 hours. Larger fragments such as endometrial curettings and colposcopic biopsies need 6 hours fixation or more. Penetration of dense tissue (such as prostatic chippings) or collagen (especially skin) is slow, and these tissues require at least 18 hours fixation. Major resections commonly require overnight fixation to make the tissue firm enough to cut, followed by a second period of overnight fixation to fix the tissue blocks. Inadequate fixation before processing produces poor preservation, which in some cases will make the biopsy impossible to interpret and in many cases will reduce the yield of information.

Note:
Formalin contains formaldehyde, which is toxic. All departments must be aware of how to deal with a formalin spillage and have risk assessments and training available in their department to help minimise this risk. MSDS sheets can be obtained from Pathology.
Any formalin spillage should be acted upon immediately and recorded as an Enhance.

Small Biopsy Specimens in Formalin

Most biopsies, especially mucosa, become very distorted by shrinkage during fixation, which considerably reduces the information which can be obtained; this can be virtually eliminated by flattening the biopsy gently, mucosal surface up, on a piece of fine card (coarse fibres such as those in blotting paper, paper towel, or gauze can make section cutting impossible); it should be allowed to adhere for about 30 seconds before being placed in formalin. The volume of formalin should be at least ten times the volume of the tissue.

Specimens containing bone:

Bone Marrow Trephines require decalcification and the **minimum** turnaround time for a report is 5 days.
Other specimens, which contain bone, will take longer than 1 week.

Product of Conception

Product of conception specimens including specimens from suspected ectopic pregnancy specimens must always be accompanied by a **completed consent form**.

Frozen Sections

All frozen sections should be booked in advance if possible. Inform the laboratory of the date and the approximate time of the operation, name of the patient, type of specimen and the reasons for the frozen sections. The specimen should **NOT** be put in formalin but should be sent to the laboratory immediately. The reporting pathologist will telephone a result within 20 minutes.

Urgent Requests:

Urgent requests must be discussed with a Consultant Histopathologist.

Larger Specimens in Formalin

The specimen should be sent in a sealed container of sufficient size to permit easy removal.

- Specimens up to about 50ml can be sent in a disposable 350ml container, filled with formalin.
- Specimens larger than this should be placed in a plastic bucket of appropriate size and covered with

formalin.

The container should be sent to the Department within 2 hours and before 4.00pm, so that it can be opened/sliced and immersed in adequate formalin. Delay produces unsatisfactory fixation and potential loss of important information such as tumour type, depth of invasion, and margins.

We recommend that resected organs are not opened in theatre by the Surgeons themselves, but that specimens are transferred as soon as possible to the Histopathology Department. However, if Surgeons feel that they need to open organs, we suggest the following guidelines:

Segments of intestine should first be opened along the anti-mesenteric border, and stomach along the greater curvature.

The uterus should be opened by transverse section through the endocervical canal 2cm above the external os, followed by a single median slice through the anterior wall down to endometrium.

Other organs should not be opened or sliced, as the probability of information being lost by unskilled slicing is greater than the probability of loss by poor fixation. A delay of several hours in providing adequate exposure to adequate volumes of fixative will inevitably cause poor preservation and should be avoided if at all possible.

Special Fixatives

Specimens for immunofluorescence: a special transport medium (Michel's media) is available from St John's Institute for Dermatology, London. Specimens must be dispatched direct to St Johns **NOT** to the Histopathology department. Tissue left dry or placed in formalin is useless.

Processing

The standard processing schedule is overnight, from 5.00pm to 8.00am, and tissue must therefore be adequately fixed by about 4.00pm to catch the schedule. The tissue blocks are embedded and sections are cut and stained the following day.

Reporting of Results

Urgent small biopsy results can be available within 48 hours in exceptional cases telephone escalation to Manager. Routine and complex specimens will take longer.

Total 7 day TAT:	90%	(cases for MDT)
Total 10 day TAT:	80%	(all cases)
Total 21 day TAT:	95%	(all cases)

Report distribution

Reports are entered on the computer, authorised and printed; the printed reports are available on the Sunquest ICE 15 minutes after authorisation. Printed reports are dispatched twice per day to both wards and GP surgeries.
Frozen section reports are telephoned to requesting surgeon after reporting. Please ensure you provide a contact number on the request form.

Private reports after authorisation are emailed and/or posted as required.

Lab activities

- Examination of tissues in order to identify or exclude morphological and cytological abnormalities for the purpose of diagnosis
- Tissue processing
- De-calcification
- Tissue embedding
- Microtomy
- Cryotomy
- Routine morphological staining for the detection of:
    - Basophilic and eosinophilic structures
- Special stains for the detection of:
    - Acid mucopolysaccharides
    - Acid and Neutral Mucopolysaccharides
    - Helicobacter Pylori
    - Neutral Mucopolysaccharides, glycogen and fungus
    - Elastic fibres and connective tissue
    - Helicobacter/Microorganisms
    - Gram positive and negative micro-organisms
    - Fungi (Aspergillus) and Pneumocystis
    - Elastic fibres and connective tissue
    - Melanin, Argentaffin cells and Lipofuscin pigment
    - Melanin
    - Connective tissue and fibrin
    - Copper assoc. Protein and Hepatitis B
    - Neutral Mucopolysaccharides, glycogen and fungus
    - Reticulin fibres
    - Mast cells
    - Calcium
    - Tubercle bacilli
- Immunohistochemistry to detect the following:
    - Smooth muscle cells, myofibroblasts, myoepithelial cells, Diagnosis of leiomyomas, leiomyosarcomas
    - Broad band cytokeratin marker, epithelial cell carcinomas
    - HGPIN, prostate adenocarcinoma
    - BCL-2 oncoprotein
    - BCL-6 gene
    - Epithelial cell types
    - Ovarian cancer
    - Carcinomas, RCC
    - Reacts with human calretinin and intracellular calcium binding protein. Marker for mesotheliomas
    - T cells
    - Mature T cells, T cell lymphomas
    - Granulocytes Reed-Sternberg cells
    - Mature B cells, Follicular dendritic cells
    - B cells, some T cells
    - B Cells, Reed-Sternberg cells
    - Reed-Sternberg cells and ALCL
    - Haematopoietic cells, vascular endothelium
    - T cells and some soft tissue
    - Leukocyte common antigen

- Neuroendocrine cells
- Macrophages
- B lymphocytes
- GIST
- Plasma cells
- Adenocarcinoma and carcinoid (intestinal epithelium)
- CEA glycoproteins in adenocarcinoma
- Neuroendocrine tumours
- Stratified squamous epithelium, basal cells, mesotheliomas
- Normal and neoplastic epithelia
- Glandular and transitional epithelium
- Basal cell carcinoma, squamous cell carcinoma
- Adenocarcinomas
- Adenocarcinomas, columnar epithelial cells
- Striated and smooth muscle cells
- Normal duct epithelial cells, ductal carcinoma
- Nuclei of cells containing a high level of oestrogen
- V.W factor in endothelial cells
- Mesothelial Cells Thyroid carcinomas
- Melanoma, melanocyte differentiation
- Proliferating Cells
- B cells and plasma cells
- Melanoma marker
- Epithelial tissue from glandular to stratified squamous
- Peripheral nerves, neuroendocrine tumours
- Seminomas
- HPV driven tumour eg Squamous cell carcinoma
- Neoplastic cells in epithelium
- Squamous epithelium
- Nuclei of cells showing expression of Progesterone
- Prostate secretory and ductal epithelium
- Schwann cells, nerve processes, S100 +ve neoplasms eg Melanoma
- Smooth muscle cells, myoepithelial cells
- Neuroendocrine cells
- TTF-1 found in lung and thyroid (thyroid follicular cells)
- Cells of mesenchymal origin
- Epithelial cells and smooth muscle in fallopian tube. Wilms tumour
- Human Epidermal Growth Factor Receptor 2 (HER 2) oncoprotein expression in breast cancer

19. Diagnostic non-gynae cytology

Key contacts

Lead Clinician

Dr Seema Angra direct line 01438 286165 (ext 6165)
Secretary direct line 01438 286124 (ext 6124)

Consultant Histopathologists

Consultants:		**Secretary**
Dr A Narula	01438 286326 (ext 6326)	01438 288040 (ext 8040)
Dr W Mohamid	01438 285279(ext 5279)	01438 286074(ext 6074)
Dr S Agarwal	01438 288031(ext 8031)	01438 284048(ext 4048)
Dr S Angra	01438 286165(ext 6165)	01438 286124(ext 6124)
Dr K Adu-Poku	01438 286181(ext 6181)	01438 288042(ext 8042
Dr L Mears	01438 284592(ext 4592)	01438 288041(ext 8041)
Dr R Swamy	01438 284158(ext 4158)	01438 285708(ext 5708)
Dr Y Thevacumar	01438 285282(ext 5282)	01438 288043(ext 8043)
Trust Fellow		
Amali Albert		
Dr Manika Khare		
Dr Deepshikha Gaire		

Laboratory Manager:

Rachel Smith 01438 285840 (ext 5840)
Email r.smith96@nhs.net

General Queries & Results:

Office	01438 288043 (ext 8043)
Cytology Laboratory	01438 285913 (ext 5913)

Opening hours

Monday to Friday: 08.30 – 17.00

The department is situated in the Pathology Department, Level 3 at Lister Hospital.

Specimens and tests

Request Forms

Request form should ideally be labelled with a printed addressograph label with all the patient's identifiable details on. Hand written request forms are acceptable but they **must** be legible and must have a minimum of **three** patient identifiable features. These are:

a) Patients Surname and Forename
b) Patients Date of Birth
c) NHS number (10-digit number ***-***-****)
d) Hospital number
e) Patients Address

Request forms should also be filled in legibly with the following details:

a) Requesting source/location (i.e. GP surgery, ward, out-patients, etc)
b) Requesting Consultant or GP
c) Nature of the specimen/site of specimen
d) Signature
e) Brief clinical details
f) Patient Gender

This information is vital to the correct interpretation of the test material and for ensuring that results are sent to the appropriate location. Please also include a extension or bleep number, particularly for urgent samples.
Request forms are available from main pathology (ext. 5232).

Specimen Collection

All specimens must be clearly labelled with the patient's name, DOB and location. The date of collection must be stated. Samples should be delivered directly to the Laboratory on the day of collection, whenever possible, as cells deteriorate rapidly.

If specimens are not correctly labelled, they may be rejected. All fluid samples should be collected in sterile Universal containers.

For high risk specimens, such as those from HIV suspected or positive patients, Hepatitis or Tuberculosis suspected patients, the specimen and form must be clearly labelled as "High Risk".

If overnight storage of a sample is unavoidable, please store the specimen in a refrigerator and dispatch to the laboratory as soon as possible on the next day.

Types of specimens

1	Fine needle aspirations. (FNA) of easily accessible solid or cystic lesions. e.g. breast, thyroid, lymph nodes, salivary glands, subcutaneous masses.	5	Brushings eg. CBD, nasal, gastric, oesophageal
2	Respiratory samples eg. Sputum, bronchial washings	6	CSF
3	Urine	7	Skin scrapes
4	Body cavity fluids e.g. ascitic, pleural, synovial.	8	Joint fluid-crystal examination

Please note. Cells degenerate rapidly. Samples for cytological examination must be sent to the laboratory as soon as possible. Enquiries regarding specimen collection should be directed to the laboratory on ext 5913.

Any high- risk specimens, e.g. HIV infection, Hepatitis B or C, should be identified clearly on both the sample and request form.

Collection/transport fluid, Cytolyt ® is available from the Cytology Dept.
Pathologists are available to undertake skin scrapes and Fine Needle Aspirations (FNA) on palpable masses. Please contact the office 01438 288043 or ext. 8043 for further information.

1. Fine Needle Aspirates (FNA)

- Make 1-2 air-dried slides & wash needle in a collection fluid, Cytolyt ® solution, supplied by the Cytology department (or sterile saline can be used if necessary)
- Do NOT reuse needle to repeat FNA, use a new needle.
- Label slides with a pencil, place in the transport box, label Universal container of washings and send to the laboratory.
- Complete request form including patient details, specimen type and site, and appropriate clinical information - including date of next clinic appointment if appropriate, and destination that results are to be sent to.
- Send sample and request form to the laboratory immediately.
- For Thyroid FNA take 6 slides in total, 3 air-dried and 3 fixed with Cytofixx provided by the Cytology Department.

2. Respiratory samples

- Sputum - a sputum pot of an early morning deep cough specimen, should be sent on 3 successive days.
- Bronchial washings - sample container of wash/trap specimen without fixative.
- Bronchial brush - place cut end of brush into collection fluid (Cytolyt ® solution).
- Do NOT leave brush inside the sheath.

3. Urine

- A Universal container of freshly voided urine - **NOT** the first specimen of the day. **(Please note: *do not* use urine monovettes)**
- If not a voided specimen please identify the type e.g. catheter, ileal conduit or cystoscopy
- Send immediately to laboratory.

4. Fluids

- Send a fresh specimen.
- Do NOT send entire bag - Disperse any sediment and send an aliquot of fluid in 1-2 Universal containers.
- Peritoneal and other washouts should be clearly identified as such.

5. Brushings

- Cut off the end of endoscopy brush and place in a cytology collection fluid (Cytolyt ® solution)
- Please identify the site and give relevant clinical details on the request form.
- Send to the laboratory as soon as possible.

6. CSF

- Cytology is for the detection of abnormal cells.
- Please send to the laboratory immediately.
- Requests for all cell counts for different departments will require separate samples and ICE requests, ie for Micro/ PHE.

7. Skin scrapes - This is done by Dr R Swamy Booking follow the frozen section path

- These should be spread thinly and evenly across a labelled glass slide.
- If possible, 2 slides – one fixed immediately without drying, the other air-dried rapidly.

8. Joint fluid-crystal examination

- Fresh sample in plain universal container

Turnaround times for diagnostic specimens

The Cytology Department aims to provide a quality service to its users and prompt turnaround times are essential in achieving that aim. Depending on the time specimens are received into the laboratory, the following turnaround times may be used as a guide:-

Urgent specimens: 24 hours
Urgent specimens must be clearly marked as **Urgent** and a contact telephone or bleep number must be given on the request form.
Non-urgent specimens: 72 hours
Please Note: For any specimen, the Consultant Pathologist may request the laboratory to carry out additional ancillary procedures to assist with the diagnosis. These include special stains or immunohistochemistry. Occasionally a cell block preparation may also be required. . This may delay the issue of a final report. In these cases an interim report either written or verbal may be issued by the reporting pathologist. Clinical advice from a Consultant Pathologist is available upon request.

Cervical Cytology Samples

Cervical cytology service is provided by Norfolk and Norwich Laboratory at the following address.

Cervical Cytology Laboratory
Norfolk and Norwich University Hospital
Colney Lane
Norwich
NR4 7UY
Contact: 01603 287412

Email: nnu-tr.cytology@nhs.net

Sample preparation

Sample vials *must* be labelled with at least 3 identifiers – Surname, forename, DOB and/or NHS number.
All routine cervical screening samples should be accompanied by the national request form HMR 101/5.
The patient's full name, address, DOB and NHS number *must* be written on all request forms and all parts of the form should be completed.
Users are encouraged to use the pre-printed HMR 101 form from the Open Exeter system

If you have any difficulty in accessing Open Exeter, contact Andrew Martin, NHS Hertfordshire, 01707 369756.

Cervical samples from hospital clinics should be accompanied by the white and purple three-part Histology Request form.

Turnaround times for cervical cytology

From December 2010 all cervical screening services have to ensure a 14-day turnaround time. This is from the date of the sample being taken to the time that the woman receives her result letter. It is essential that all cervical samples are sent to the laboratory immediately in order to help achieve this target.
Further information can be found in the NHS CSP document: Cytology improvement guide – achieving a 14 day turnaround time in cytology. *(November 2009).* Please see the link below.
http://www.cancerscreening.nhs.uk/cervical/14-tat.html

Cervical Cytology Sample Taker Training

For information on sample-taker training please contact Roseanna Bignell, Network Laboratory Manager on the telephone number or email address shown above.

Lab activities

- Examination of cellular material in order to identify or exclude morphological and cytological abnormalities
- Demonstration of:
    - Cells (nuclei and cytoplasm) and micro organisms
- Cytopathology (Non-Gynae) examination activities for the purposes of clinical diagnosis
- Examination of cellular material in order to identify or exclude morphological and cytological abnormalities
- Demonstration of:
- Cells (nuclei and cytoplasm) and micro organisms

Referral of Tests in Cellular Pathology

The Cellular Pathology department based at The Lister Hospital has a large reportiore of special staining techniques and an extensive panel of immunohistochemistry test in-house.
On occasions it may be required that specific tests not performed in-house are sent elsewhere to referral labs. Please refer to table below for list of referral tests which are sourced externally:

Laboratory Name:	Address:	Referral Tests performed:	TAT for referral Test
HSL-AD	HSL-Advanced Diagnostics Ground Floor 60 Whitfield Street London W1T 4EU	• IHC tests which are not performed routinely in-house • ALK, ROS, PDL-1 • All FISH assays (inc HER2, ALK, ROS)	• 24 hrs • 5- 8 working days (includes interpretation) • 5 Days*
Sarah Cannon Molecular Lab	Sarah Cannon Molecular Lab Shropshire House 1 Capper Street Fitzrovia London WC1E 6JA	• NGS (Multigene Panel) • MLH-1 Hypermethylation	• 8-10 working days • 5 working days

		• BRAF single gene • EGFR single gene (rapid)	• 5-7 working days • 48 hrs
Source Bioscience	Source Biosciences 1 Orchard Place Nottingham Business Park Nottingham NG8 6PX	• Gastric HER2	• 5 days
North Thames Genomic Hub	Clinical Genomics MolecularDiagnostics Dept The Centre for Molecular Pathology The Royal Marsden NHS Foundation Trust 15 Cotwold Road Sutton, Surrey SM2 5NG	• NTRK fusion testing	• 10-14 days

Appendix 1. Full referral addresses

CODE	Full address
ADI	Department of Clinical Biochemistry & Clinical Immunology Box 232,Level 4, Addenbrookes NHS Trust Hills Road, Cambridge, CB2 2QQ Tel: 01223 336792
AGH	Cambridge Genomic Laboratory, Box 143, ATC level 6 Cambridge University Hospital Foundation Trust, Addenbrooke's Hospital Hills Road, Cambridge, CB2 0QQ
AML	Antimicrobial Reference Laboratory Level 2, Phase 1, Pathology Sciences Building Southmead Hospital Westbury-on-Trym Bristol, BS10 5NB Tel: 0117 4146220
BED	Clinical Biochemistry Bedford Hospital NHS Trust Kempston Road, Bedford, MK 9DJ Tel: 0 1234795915
CHX	The SAS Laboratories Clinical Biochemistry & Medical Oncology Charing Cross Hospital Fulham Palace Road, London, W6 8RF Tel: 020 3313 5353
CAR	Cardiff Toxicology Laboratory 4th Floor, Academic Centre University Hospital Llandough Penlan Road, Llandough, Penarth Vale of Glamorgan, CF64 2XX Tel: 029 2071 6894
CVU	Cardiff and Vale University Health Board UHW University Hospital of Wales Heath Park Cardiff CF14 4XW Tel: 029 2074 7747
EKE	Immunology Laboratory William Harvey Hospital Kennington Road Willesborough Ashford Kent TN24 0LZ Tel: 01233 616287
GOS	Chemical Pathology Great Ormond Street Hospital for Children Great Ormond Street, London, WC1N 3JH Tel: 0207 405 9200 and dial 5009
HOM	Dept of Clinical Chemistry Homerton University Hospital NHS Foundation Trust Homerton Row, Hackney, E9 6SR Tel:0208 510 7887/7888
ION	Department of Neuroimmunology & CSF Laboratory Room 917, Institute of Neurology Queen's Square, London, WC1N 3BG Tel:0203 4483814/3844
RDE	Synnovis Analytics LLP Department of Clinical Biochemistry Kings College Hospital

	Denmark Hill, London, SE5 9RS Tel: 020 3299 4126
KIT	Toxicology Laboratory 3rd Floor, Bessemer Wing King's College Hospital NHS Foundation Trust Bessemer Road, Denmark Hill London SE5 9RS Tel: 020 3299 5883
LTH	The Department of Blood Sciences, Leeds Teaching Hospitals NHS Trust, The Old Medical School, Great George Street, Leeds, LS1 3EX
MRI	Clinical Biochemistry Manchester Royal Infirmary Oxford Road Manchester M13 9WL Tel: 0161 276 8766
MTL	Central Specimen Reception North Wing - 5th Floor St Thomas' Hospital Westminster Bridge Road London SE1 7EH
MWY	Biochemistry Department Clinical Science Building Wythenshawe Hospital Manchester University NHS Foundation Trust Southmoor Road Manchester M23 9LT Tel: 0161 291 2126.
NNH	Norfolk and Norwich University Hospitals NHS Foundation Trust Calcium and Bone Metabolism Laboratory Laboratory Medicine Level 1, East Block Colney Lane Norwich NR4 7UY
NOT	Molecular Diagnostics Section Dept Clinical Pathology Nottingham University Hospitals Queens Medical Centre Campus Nottingham NG7 2UH
OXF	Clinical Laboratory Immunology Churchill Hospital Churchill Drive Old Road

	Headington Oxford OX3 7LE
QUE	Neurometabolic Unit (Box 105) 6th floor, Institute of Neurology Queen Square House Queen Square London WC1N 3BG Tel: 020 344 83818
RSC	SAS peptide Hormone Section, Clinical Laboratory Royal Surrey County Hospital Egerton Road, Guildford, GU2 5XX Tel: 01483 406715
STS	Supra-Regional Assay Laboratory Specialised laboratory Medicine DU [Chemical Pathology] 5th Floor, North Wing, St Thomas Hospital Lambeth Palace Road, London, SE1 7EH Tel: 020 7188 7188
SAN	Department of Clinical Biochemistry City Hospital Dudley Road Birmingham B18 7QH Tel: 0121 507 3517
SGP	Protein reference Unit & Immunopathology Level 2, Jenner Wing, St George's Hospital Tooting, London, SW17 ONH Tel: 0208 725 0025
SIH	UCLH SIHMDS SIHMDS Flow Cytometry Level 2 Halo Health Services Laboratories The Halo Building 1 Mabledon Place London, WC1H 9AX
STH	Department of Chemical Pathology & Metabolism St Helier Hospital Wrythe lane, Carshalton, SM5 1AA Tel: 01372 735258
SHP	Immunology Department & Protein Reference Unit P.O. Box 894 Sheffield, S5 7YT Tel: O114 2715552
UCLH	University College London Hospital, Special Chemistry 3rd Floor, 60 Whitfield Street London, W1T 4EU Tel: 020 3447 9405
QEH	University Hospitals Birmingham NHS Foundation Trust Clinical Laboratory Services, Level -1 Queen Elizabeth Hospital Mindelsohn Way Edgbaston Birmingham B15 2WB

Appendix 2. Sunquest ICE Order Communication System

Requesting Pathology tests and accessing results using Sunquest ICE
We strongly recommend interaction with Sunquest ICE software for requesting pathology and accessing results for the following disciplines:

- Blood Sciences (Haematology, Clinical Biochemistry, Immunology)
- Cytology
- Microbiology
- BT (additional labelling criteria see BT specific section if Handbook)
- Cellular Pathology

Instructions for the use of Sunquest ICE are available from the Pathology section on the Knowledge centre (Clinical departments, Pathology, Pathology handbook - Pathology User Guide / ICE requesting tests / ICE reviewing results).
Training for ICE - user accounts and training enquiries should be directed to the ICE team at enhtr.iceocs@nhs.net or on Lister extension 4798.

Specimen labelling for Sunquest ICE requests

All specimens must be accurately labelled with at least the minimum patient identification details listed in section 4. The specimen should be labelled at the time of collection. All specimens should be labelled with the ICE OCS generated bar-code label or if necessary, completed by hand. **Use of addressograph labels on specimen containers, other than Histology, is forbidden.** (This has been shown to be linked with increases in sample mislabelling).
Samples for blood transfusion must be hand-written. ICE OCS generated bar-code labels are not acceptable for transfusion purposes.