

CHEMICAL PATHOLOGY (BIOCHEMISTRY) USER HANDBOOK



Chemical Pathology (Biochemistry) Laboratories:

Level 3 – East
Darent Valley Hospital
Darenth Wood Road
Dartford
DA2 8DA

Level 4 – Red Zone
Medway Maritime Hospital
Windmill Road
Gillingham
ME7 5NY

Timely, Accurate Results, Providing Effective Care

Medical and Scientific staff within the Laboratory Biochemistry Department have compiled this handbook in consultation with users to provide information about our services and ensure a full understanding of those services to enable their use to full potential.

The information is accurate at the time of issue, but is reviewed and updated as appropriate.

We welcome your comments or suggestions so that we are aware of, and can consider your requirements.

BIOCHEMISTRY

Laboratory Biochemistry is the study of analytes e.g. hormones, tissue markers, toxic materials, glucose and elements (Potassium, Sodium and Calcium etc) in blood, urine, CSF and biological fluids and faeces. Diagnostic laboratory work is undertaken by Biomedical Scientists (BMS) who are state registered and Healthcare Scientific Support Workers (HSSWs)

NKPS Biochemistry offers a full biochemistry service, including:

- General biochemistry
- Hormones
- Tumour markers
- High sensitivity Troponin I (hsTNI)
- Proteins – serum and urine electrophoresis, immunoglobulin and complement
- Therapeutic drug monitoring – digoxin, theophylline, lithium, phenytoin, carbamazepine and valproate
- Toxicology – salicylate, paracetamol, ethanol
- Haemoglobin A_{1c}
- Urine 5 HIAA and metanephrines
- Sweat chloride

Specialised investigations are referred to outside reference laboratories when necessary. Information concerning test availability and estimated turn round times is given later in the handbook.

The Biochemistry Department participates in External Quality Assessment Schemes for all assays where schemes are available and holds UKAS accreditation to the scope detailed on Adagio.

The laboratory is located on the third floor, East Wing of Darent Valley Hospital and level 4 red zone of Medway Maritime Hospital. Visitors are welcome by prior appointment. All doors to the Pathology Department are locked at all times. Entry is for authorised personnel only. All other personnel must report to Pathology Reception.

The laboratory complies with the Trust Information Governance procedures and has internal Policy for Management of Data and Information (Pathology 2887) to ensure protection of personal information.

The complaint procedure for the laboratory is to make a formal complaint to the PALS office which is forwarded to the General Manager of Pathology or Designated Individual to investigate and respond to the Trust Complaints office within the required timescale; for further information refer to POL.PAT.33 Complaints and Compliments Policy.

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DEPARTMENT OF BIOCHEMISTRY

1. GENERAL INFORMATION

1.1 Pathology Department Key Personnel

DVH switchboard 01322 428100 MFT switchboard 01634 830000

Department	Telephone	email address
General Manager Tina Bailey	x8499	Tina.bailey3@nhs.net
Chemical Pathology		
Dr. Padmini Manghat Lead Consultant Chemical Pathologist	x8481	Padmini.manghat@nhs.net
Dr Rochin Patle Consultant Chemical Pathologist	x5235 (MMH)	Rochin.patle@nhs.net
Natalie Walsham Consultant Clinical Biochemist	x8497	Natalie.walsham@nhs.net
Karen Williams Clinical Biochemist (Mon, Tue, Wed)	x5119 (MMH)	Karenwilliams7@nhs.net
Derek Smith Scientific lead BMS	x8079	dsmith38@nhs.net
Sample Reception Team Leaders: Rachel Tremain Joanna Gilham Justyna Graffstein Lydia O'Driscoll	x4885	r.tremain@nhs.net joanna.gilham2@nhs.net jgraffstein@nhs.net lydia.o'driscoll@nhs.net
Tracy Wynn Pathology Quality and Governance Manager	x8492	Tracy.wynn@nhs.net
Tony White Pathology Information & IT Systems Manager	x8479	Tony.white3@nhs.net

1.2 Contact numbers for results:

Chemical Pathology

Results enquiries routine hours	x8489 (Dartford) x6434 (Medway)
Specimen enquiries routine hours	x4885 (Dartford) x6434 (Medway)
Out of hours	07375 825808 (Dartford) 07810 050183 or #6164 (Medway)

1.3 Opening Hours

Biochemistry 01322 428489 (DVH)

01634 830000 x6434 (MFT)

The departments will be pleased to answer all your enquiries about pathology services and the department. For technical or clinical advice, given on a case by case basis as required, they will ensure that your enquiry is directed to a suitably qualified person in the relevant department.

Routine Opening Hours (Dartford):

Pathology Reception Level 3, East

Monday – Friday
08.30 – 17.00hrs

Biochemistry Laboratory Level 3, East

Monday – Friday
09.00 – 17.00hrs

Central Specimen Reception Level 3, East

Monday – Friday
09.00 – 17.00hrs

Phlebotomy Out Patients Darent Valley Level 2, Central

This service is not operated by North Kent Pathology Service; opening hours are:
Monday – Friday
08.30 – 16.55hrs

Phlebotomy Clinic, Gravesham Community Hospital

This service is not operated by Dartford and Gravesham NHS Trust.
To check opening times and for further information please telephone 01474 360500

Out of Hours Service

The Chemical Pathology laboratory operates an out of hour's service for acute service users outside of core hours:

Out of Hours Monday – Friday 17.00 – 09.00hrs

Weekends and Bank Holidays - continual 24/7 out of hours cover.

Contact on call Biomedical Scientist or medical staff via switchboard 01322 428100

There is no out of hours phlebotomy service.

Routine Opening Hours (Medway):

Biochemistry Laboratory Level 4, Red zone

Monday – Friday
09.00 – 17.00hrs

Central Specimen Reception Level 4, Red zone

Monday – Friday
08.00 – 17.30hrs

Phlebotomy Outpatients Elliot Ward

This service is not operated by North Kent Pathology Service; opening hours are:

Monday – Friday
08.00 – 16.30hrs

Phlebotomy Clinics – Various locations

This service is not operated by Medway NHS Foundation Trust.

To check opening times and for further information please telephone 01634 471098 or visit <https://www.medwaycommunityhealthcare.nhs.uk/our-services/a-z-services/blood-test-service>

Out of Hours Service

The Chemical Pathology laboratory operates an out of hours service for acute service users outside of core hours:

Out of Hours Monday – Friday 17.00 – 09.00hrs

Weekends and Bank Holidays - continual 24/7 out of hours cover.

Contact on call Biomedical Scientist 07810050183 (#6164) or medical staff via switchboard 01634 830000

There is a ward phlebotomy service on Saturday morning; request forms for this service must be in Pathology by Friday evening.

1.4 Pathology Sample Delivery Service (Dartford)

Appropriate pathology samples (see below) may be sent to the department by the pneumatic air tube delivery system from a variety of locations in the hospital at Darent Valley –

- Phlebotomy Outpatients
- Accident and Emergency (A/E)
- Intensive Care Unit (ICU)
- Tambootie Ward (SCBU)
- Rosewood Ward
- Delivery Suite
- Redwood Ward
- Cherry Ward
- Pine Therapy Unit
- Rosewood
- Poplar

In all other areas of the hospital, samples are sent to Pathology via portering services x8888.

The pneumatic air tube system is operated by Serco. When unavailable, samples must be sent via portering services and the Serco Help Desk contacted on 8888 to report pneumatic tube failure.

Samples are collected via a courier service from GP surgeries within the service locality. Samples are collected from Queen Mary's Sidcup via a courier service provided by Delta. Samples from GP surgeries in the Medway area are delivered to Darent Valley via a courier service provided by Delta.

Urgent Samples

It is the responsibility of the person taking the sample to contact portering services to arrange speedy delivery to the laboratory or send via the pneumatic air tube system. It is recommended that the requestor contacts the relevant laboratory to confirm delivery of the urgent specimen.

Blood samples must not be kept on wards/clinics overnight

Pathology Sample Delivery Service (Medway)

Appropriate pathology samples (see below) may be sent to the department by the pneumatic air tube delivery system from a variety of locations in the hospital at Medway Maritime Hospital –

- Emergency Department (A/E) – 4 separate stations within A&E
- Intensive Care Unit (ICU)
- Oliver Fisher Neonatal unit (SCBU)
- Surgical Assessment Unit (SAU)
- Medical HDU
- Galton Day Unit
- Fetal Medicine Unit (MCU) (yellow pods for first trimester OSCAR clinic samples)
- Lister Ward (MAU)

In all other areas of the hospital, samples are sent to Pathology via the call a porter service.

Samples are collected via the hospital transport service from GP surgeries within the service locality.

Urgent Samples

It is the responsibility of the person taking the sample to contact portering services to arrange speedy delivery to the laboratory or send via the pneumatic air tube system. Samples can also be delivered to sample reception in person.

Blood samples must not be kept on wards/clinics overnight

1.5 Pneumatic Air Tube Sample Delivery System

The pneumatic air tube system is for transport of pathology samples only. (See Trust Policy for the use of the pneumatic air tube system).

The pneumatic air tube system must NOT be used for:

- Blood products including used blood/FFP/platelets etc.
- CSF samples
- Histology specimens
- Blood culture bottles
- Known high risk samples (e.g. viral haemorrhagic fever cases) or suspected emerging diseases
- Blood gas samples
- Ad hoc documentation.

Transportation of Samples

All sample containers must be properly closed and packed in the leak-proof sample bag provided by Pathology together with the request form or any order comms documentation in the attached unsealed pouch. The sample(s) must be secured in the air tube carrier pod.

It is the responsibility of the sender to ensure that:

- The sample is labelled, packed appropriately and is accompanied by the relevant documentation.
- The air tube sample carrier is secured properly before transport.
- The air tube sample carrier is sent to the correct 'system' address.

Instructions for use of the system are located at pneumatic tube stations

Spillages and Leaks

Sample bags containing leaking containers will be discarded and the sender notified. Where the leak has not contaminated the air tube carrier, no further action will be necessary.

If the leak has contaminated the inside of the air tube carrier, the carrier will be taken out of service and decontaminated appropriately.

If a leak has contaminated the outside of the air tube carrier, the air tube system will be closed down by Serco(DVH)/the laboratory (MMH) in order that a decontamination procedure may be carried out.

All areas with an air tube station will be notified by Serco/the laboratory to ensure other arrangements for sample transportation can be put in place.

Once the decontamination process is complete and the air tube system is working, users will be notified by Serco/the laboratory.

1.6 Report Availability

The following investigations are available 24/7 and will be reported within 24 hours of receipt:

- Electrolytes and creatinine
- Glucose
- Liver function
- Bone profile
- CPK
- Amylase
- CRP
- Uric acid
- Magnesium
- Cholesterol
- Salicylate and paracetamol
- Theophylline
- Digoxin
- Gentamicin
- Vancomycin
- hsTroponin I
- hCG (?ectopic pregnancy only)

Please contact the laboratory prior to sending samples for the following tests:

- Ammonia
- Ethanol (normally only with concurrent head injury)
- Lactate

Any investigations other than the above that are requested out of hours must be discussed with the on call Chemical Pathologist before they will be analysed.

All authorised results are available on the Web Browser for hospital wards and available via the GP electronic link for GP surgeries, dependent upon the time individual practices call off results into their practice systems.

1.7 Out of Hours Service

Outside routine working hours (Monday – Friday) an Out of Hours service is provided for urgent samples and clinical advice. Contact the Biochemistry BMS on-call and the Consultant Chemical Pathologist on-call via the Hospital switchboards. See Out of Hours Protocol for details.

2. SAMPLE COLLECTION

2.1 Potentially Infective Samples and High Risk Samples

All samples, but particularly those from patients suspected of having certain blood borne and other infectious diseases constitute a hazard to portering and laboratory staff handling them.

All samples are therefore managed according to standard principles applied universally. Staff are reminded to consider all samples as potentially high risk and therefore must wear gloves when handling blood, body fluids and tissue samples.

If a patient is in a particularly high risk group e.g. viral haemorrhagic fever, SARS, anthrax, the laboratory must be contacted for further advice prior to sample testing. The Biochemistry laboratory can only accept and process samples up to Category 2 risk rating.

2.2 Requesting Tests

A Trust Order Comms system has been developed for pathology requesting along with an equivalent system for GP practices.

Where Order Comms is available, it must, where possible be used for all Biochemistry requests.

The information on all order comms sets/request forms and accompanying specimen bottles must correspond and meet minimum acceptance criteria are set out in **2.4 Sample Labelling**, sections a – f. The clinical summary section on the form/ order comm must be completed and must include relevant patient information e.g. diabetic therapy, fasting/ non-fasting as examples. Incomplete forms/ order comms may cause delays in availability of results as samples may be delayed or not processed. Incorrect/incompletely labelled samples may be discarded.

All unlabelled samples will be discarded; the only exception to this is unrepeatable samples such as CSF where each incidence will be dealt with on a case by case basis.

Requesting Additional Tests

The laboratory will generally consider requests for additional tests on samples up to **3 days** after receipt of the sample. **This is subject to analyte stability/integrity and will be considered on a case by case basis.** For some analytes the integrity cannot be guaranteed after storage of varying times and in these cases we will not be able to undertake further investigations. In some cases samples are stored for longer than 3 days and subject to sample integrity we may be able to undertake additional tests beyond this period.

If further Biochemistry tests are required on a sample already received by the laboratory at Dartford the requestor must send an add on order comm or request form. If further samples are required, the test will be rejected against the existing sample episode. At Medway add on requests can be made by sending a new request form stating sample already in laboratory or over the phone.

2.3 Urgent Requests

If a request is clinically urgent please contact the laboratory and give the appropriate information to ensure priority is afforded. The samples must be clearly marked as urgent and kept separately from other samples being delivered at the same time.

2.4 Sample Labelling

Sample bottles **must not** be pre labelled before blood is drawn.

All samples must have the following patient information:

- Patient surname
- Patient first name
- Patient date of birth
- Patient NHS number or Hospital (PAS) registration number (when patient has one)
- Date and time of sampling
- Location (Ward, GP surgery) and Signature of person taking the sample (This is auditable proof of location and phlebotomist i.e. the use of order comms trace the member of staff who printed the labels which in Trust policy is the person who takes the blood and details the location the sample was taken. For non-order comm requests, the initials of the staff member who took the blood must be on the sample alongside the location).

NHS numbers or Hospital (PAS) numbers must always be used when available, as this aids successful allocation and maintenance of a single patient file on the laboratory computer system, which in turn aids effective and speedy result retrieval for users.

Positive patient identification is **essential** and in-patients must, additionally, have their wristbands checked before blood is drawn.

Samples received without full patient I.D. may be discarded and the appropriate doctor/ward informed via the electronic reporting system. Blood track labels are suitable for use on Biochemistry samples.

2.4.1 Request forms

Request forms must be fully completed and legible. The following information must be included:

- Patient surname
- Patient first name
- Patient date of birth
- Patient NHS number or Hospital (PAS) registration number (when patient has one)
- Date and time
- Sample type
- Tests required
- Location (Ward, GP surgery)
- Clinician
- Bleep number or extension number for requestor in case of any queries or abnormal results
- Relevant clinical details – this is essential to ensure all appropriate testing is carried out and aids in clinical interpretation as well. Please be specific and descriptive (“unwell” is not useful information) but succinct, include relevant treatment (eg Thyroxine). Some tests may not be processed if essential clinical information is not provided.
- Signature

General Information

Printed labels for application to patient samples are automatically generated when using Order Comms. Other printed labels may be used on Biochemistry samples and request forms, providing they contain the appropriate information and are in the correct format. Check with the Laboratory before introducing printed labels to ascertain their suitability.

Labels must be attached along the sample tube, not around it as this interferes with the operation of centrifuges and analysers. Samples with incorrectly placed labels may be rejected.

All sample containers must be properly closed and packed in a dedicated sample bag, with the request form in the attached unsealed pouch.

A new request form is required for ‘add on’ tests- for order comms this can be the order sticker.

2.5 Rejection of Samples

As a matter of quality assurance and good risk management any sample arriving in the laboratory unlabelled will be discarded. The requesting doctor will be informed via the electronic reporting system when possible (if all samples are unlabelled, a report cannot be made as the patient identity is completely obscure).

Samples may also be rejected for the following reasons:

- a) The sample is insufficient for testing
- b) The sample labelling requirements (see section 2.4) are not met
- c) The sample is haemolysed /clotted (for EDTA investigations)
- d) The sample is too old to process for particular assays
- e) The incorrect specimen type is sent to the laboratory
- f) There is any doubt over the specimen origin.

2.6 Sample Referral

Samples for referral to another hospital must always be sent via the Pathology Laboratory. This will ensure correct packaging to meet regulatory requirements and provide an audit trail for each sample.

2.7 Sample Volume

The majority of routine and referral biochemistry and immunoassay tests are performed on one gold top SST vacutainer with multiple tests requested per sample. To ensure that all requested tests are completed for each sample sent it is vital to have full samples sent for each vacutainer i.e. filled to the indicated line on each vacutainer type, please refer to volumes listed in section 2.8.

2.8 Blood tube colour code for Biochemistry

Refer to the biochemistry laboratory (x8478) if a test is not listed within this handbook or there is uncertainty of what vacutainer to use. Unless specified, one sample is sufficient for each test. The department uses the Greiner Vacuette system for venous blood sampling with the following tubes in use –

- Gold top – serum (7ml)
- Green top – lithium heparin plasma (7ml)
- Purple and white top – EDTA (HbA_{1c} only- 4ml)
- Pink top – EDTA (BNP and PTH) (7ml)
- Grey top – fluoride oxalate (2 ml)
- Dark blue top – trace metals (7ml)

For all test lists; refer to section 8.1

Patients requiring electrolyte and full blood count analysis must have the gold top sample taken before the purple EDTA sample, in order to avoid contamination of the serum sample with EDTA, causing spurious elevation of serum potassium.

If a blood sample is taken with a syringe and needle (not advised) **do not** push the needle through the septum of the blood tube, as this is likely to cause significant haemolysis of the sample, which will invalidate results for some analytes. In this case, the cap of the blood tube must be removed as well as the needle from the syringe in order to fill the tube. Plastic caps to seal the blood tube are available from the laboratory.

24 hour urine collection containers can be ordered from the hospital porters, if the collection requires a container with no preservative added. Containers with preservatives added can be obtained from reception in Chemical Pathology.

3. BLOOD SAMPLES

3.1 Venous Blood Collection

ONLY AUTHORISED PERSONS MAY TAKE VENOUS BLOOD

An evacuated blood collection system is used to collect venous blood samples within the Trust. A needle and syringe system is available for paediatric patients and those who are difficult to bleed. Paediatric sample tubes must be used for paediatrics when only small volumes of blood can be accessed.

IMPORTANT NOTE:

*If taking blood using a syringe and needle **DO NOT** transfer the blood into a vacutainer by using the vacuum to draw the blood into the bottle. This will haemolyse the sample. Remove the needle assembly and transfer the sample to the appropriate uncapped tube. Recap the tube and ensure that it is securely in place.*

4. CEREBRAL SPINAL FLUIDS

ONLY AUTHORISED PERSONS MAY TAKE CEREBRAL SPINAL FLUIDS

These are precious samples and must be sent via porter to the laboratory immediately, and must clearly be marked for what assay is required:

- Xanthochromia: must be in a white universal container, labelled '4' (**extra container required, this cannot be shared with any other CSF test**), a minimum of 1 ml of CSF sample and must be received wrapped in foil/non transparent black plastic and in a brown envelope to protect it from the light for bilirubin estimation.
- Glucose: must be collected in a grey fluoride oxalate bottle
- Protein: Must be in a white universal container
- Lactate Dehydrogenase (LDH): Must be in a white universal container
- Lactate: Must be in a grey fluoride oxalate bottle
- Oligoclonal Bands: Must be in a white universal container and a paired serum sample collected

For information on urine samples please see collection information in appendices.

5. VISITORS TO THE LABORATORY

Doors to the Pathology Department are locked at all times. Entry is for authorised personnel only. All visitors to Pathology must report to Pathology Reception at Medway please ring the bell by the window on the right as you come in. At Dartford Pathology Reception staff are responsible for meeting and greeting all visitor's and will inform laboratory personnel of the arrival of the visitors. All visitors must sign in the visitor's book on arrival and will be issued with a visitor's badge. On departure visitors must sign out the visitors' book and return the badge to the reception staff. Laboratory personnel will escort visitors at all times.

6. WORKING WITH THE LABORATORY

The Biochemistry Laboratory operates a normal working day of 09.00hrs to 17.00hrs Monday to Friday. All other times are covered by the out of hours or extended service. Where possible please organise routine samples to arrive by 16.00hrs.

Complete the request form with care. Please ensure **all** information is given including clinical details. These are essential if the correct tests are to be carried out, to aid interpretation and help with appropriate advice where relevant.

Out of hours tests must only be those required for the immediate care of the patient. The out of hour's service is available to acute care only.

If the request is clinically urgent please contact the laboratory and give the relevant information to ensure appropriate priority is afforded.

A successful pathology service depends on the quality of the relationship between requestors and providers. We welcome visits to the department and to meet the staff. To make an appointment please contact the Office Manager 01322 428100 ext 8488.

7. CONSULTANT CLINICS

For DVH information about clinics can be found on the Trust website www.dvh.nhs.uk and the Trust intranet site ADAGIO. Searching under individual consultants gives all clinic information for that consultant.

At Medway Lipid clinics are run on a Monday and Wednesday morning and a metabolic stone clinic is run fortnightly on a Friday morning.

8. FURTHER INFORMATION

8.1 BIOCHEMISTRY TESTS.

Test names highlighted **blue** are analysed at both NKPS sites, **green** are analysed at DVH only and **amber** are analysed at Medway only. Those with no colour are referral tests. Where the turnaround time is stated as 'within 24hrs' samples from urgent work areas have a target 1hr turnaround time, those from inpatient ward areas have a 4hr target and all other requests 24hr.

Routine Blood Tests					
Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
3-methoxytyramine	Purple	<180pmol/L (seated or supine)	7 days	Referral	Performed at East Kent University Hospitals NHS Trust
17-Hydroxyprogesterone	Gold	Up to 16 years: 0.0-4.0 nmol/L >16 years: 0.0-5.0 nmol/L	2-3 weeks	Referral	Performed at Synnovis (GSTS)
ACTH	Purple	9 am <50 ng/L Midnight <10 ng/L	3-4 weeks	Referral	Performed at Synnovis (KCH) Please see Appendix ii for sample requirements
Acylcarnitine	Green	No reference range	3-4 Weeks	Referral	Sheffield Teaching Hospital
Albumin	Gold	Adult: 35-50 g/L 0-1 year: 30-45 g/L 1-16 yrs: 30-50 g/L	Within 24hrs	Yes	
Alcohol	Grey	mg/L	Within 24hrs	Yes	
Aldosterone* <i>*Note sample type is different for each site.</i>	Green (DVH) Purple (Medway)	90-700 pmol/L	6 Weeks	Referral	Dartford - Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements. Medway – Synnovis
Alkaline Phosphatase	Gold	Adult:30-130 U/L 0-4 weeks: 70-380 U/L 4weeks-16 years: 60-425 U/L	Within 24hrs	Yes	
Alkaline Phosphatase isoenzymes	Gold	Pattern reported	4 Weeks	Referral	East Kent University Hospitals NHS Trust

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Alpha fetoprotein (AFP)	Gold	<7.4 KU/L	Within 24hrs	Yes	
Alanine transaminase (ALT)	Gold	Male: <50 U/L Female: <35 U/L Up to 1 year: 13-45 U/L	Within 24hrs	Yes	
Anti-Mullerian Hormone (AMH)	Gold	Refer to report	3-4 weeks	Yes	Available for funded patients via fertility consultants only.
Amino Acid Chromatography	Green	Pattern reported	4 Weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements
Ammonia	Green	6-47 µmol/L Sick/ premature <150 µmol/L Neonate <100 µmol/L Infant- 16 years <50	Within 2hrs	Yes	Transport to laboratory on ice
Amylase	Gold	28-100 IU/L	Within 24hrs	Yes	
Androstenedione	Gold	Male: 1.4 – 9.1 nmol/L Female : 1.4 – 14.3 nmol/L	3-4 weeks	Referral	Performed at Synnovis (KCH)
Angiotensin Converting Enzyme (ACE)	Gold	8-52 IU/L	6 weeks	Referral	Performed at East Kent University Hospitals NHS Trust
α ₁ -Antitrypsin	Gold	1.1-2.1 g/L	2-3 Weeks	Referral	East Kent University Hospitals NHS Trust. Low values will have phenotype determined at St George's (report comes back from East Kent). Turnaround time for phenotype results is 6 weeks.
α Subunit of TSH	Gold	0.00-0.69 IU/L	2-3 weeks	Referral	Not routinely available to Primary Care. Please discuss with Clinical Scientist. Performed at Synnovis (GSTS)

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
AST	Gold	<p>Male:</p> <p>Adult 10-37IU/L</p> <p><4 years 20-60 IU/L 4 years to <7 yrs 15-50 IU/L 7 years to <9 yrs 10-40 IU/L 9 yrs to <12 yrs 10-60 IU/L 12 yrs to <16 yrs 15-40 IU/L 16 yrs to <19 yrs 10-45 IU/L</p> <p>Female:</p> <p>Adult:10-31 IU/L Pregnant: 10-37 IU/L</p> <p><4 years 20-60 IU/L 4 years to <7 yrs 15-50 IU/L 7 years to <9 yrs 10-40 IU/L 9yrs to <12 yrs 10-40 IU/L 12 yrs to <16 yrs 10-30 IU/L 16 yrs to <19 yrs 5-30IU/L</p>	Within 24hrs	Yes	Positive interference with haemolysis
B2 microglobulin	Gold	No reference range stated, please refer to ISS stage.	Within 7days	Yes	For haematology oncology patients
Bicarbonate	Gold	22-29 mmol/L	Within 24hrs	Yes	
Bile Acids	Gold	<10 µmol/L	Within 24hrs	Yes	
Bilirubin (Total)	Gold	0-2 weeks 0-205 µmol/L >2 Weeks 0-21 µmol/L	Within 24hrs	Yes	
Bilirubin (Conjugated)	Gold	<3.4 µmo/L	Within 24hrs	Yes	
Biotinidase	Green	4-15 nmol PABA/ml plasma/minute	6 weeks	Referral	Performed at Synnovis (GSTS SPOTON Clinical diagnostics). Please see Appendix ii for sample requirements

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
B Type Natriuretic Peptide (BNP)	Pink	0-99 pg/mL	5 days	No	For Dartford - Primary care only. Must be in the Laboratory within 12 Hours of collection. For Medway available to some cardiology/heart failure team inpatients, results normally available in this instance within 24hrs.
C-Peptide	Gold	370-1470 pmol/L	2-3 weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements (Insulin/C-peptide)
C-Reactive Protein (CRP)	Gold	<10 mg/L	Within 24hrs	Yes	High sensitivity method
C1 Esterase Inhibitor	Gold	0.15-0.35 g/L	3-4 weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements
C3 Complement	Gold	0.90-1.80 g/L	7 days	Yes	
C4 Complement	Gold	0.10-0.40 g/L	7 days	Yes	
CA 125	Gold	0-35 kU/L	Within 24hrs	Yes	Can be increased in pregnancy, menstruation, endometriosis, ascites, cirrhosis, renal failure, acute pancreatitis and peritonitis.
CA15-3	Gold	0-23 kU/L	7 days	Yes	
CA19.9	Gold	0-35 kU/L	Within 24hrs	Yes	Can be elevated in obstructive liver disease
Cadmium	Green	Non-smokers: < 27 nmol/L (< 3 µg/L); Smokers < 53 nmol/L (< 6 µg/L)	2-3 weeks	Referral	Performed at Synnovis (KCH). Please see Appendix ii for sample requirements
Caeruloplasmin	Gold	0.07-0.24 g/L 0 m - 2 m 0.14-0.33 g/L 2 m-6 m 0.14-0.39 g/L 6 m - 12 m 0.22-0.43 g/L 1 y - 8 y 0.21 - 0.40 g/L 8 y - 14 y 0.17 - 0.35 g/L 14 y - 19 y (male) 0.21 - 0.43 g/L 14 y – 19y (female) 0.20 – 0.60g/L Adults	2 weeks	Referral	Performed at East Kent University Hospitals NHS Trust

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Calcitonin	Gold	<11.8 ng/L (Male) <4.8 ng/L (Female)	3-4 weeks	Referral	Performed at Synnovis (KCH) Needs to be centrifuged and serum frozen quickly. Please see Appendix ii for sample requirements.
Calcium (Adjusted)	Gold	2.20-2.60 mmol/L	Within 24hrs	Yes	Measure albumin at same time.
Carbohydrate Deficient Transferrin	Gold	<1.6%	2-3 weeks	Referral	Performed at Synnovis (GSTS)
Free Carnitine	Gold	15-53 µmol/L	2-3 weeks	Referral	Guy's Hospital Genetics Centre
C8 Carnitine	Gold	0-0.3 µmol/L	2-3 weeks	Referral	Guy's Hospital Genetics Centre
C14:1 Carnitine	Gold	0-0.2 µmol/L	2-3 weeks	Referral	Guy's Hospital Genetics Centre
C18:OH Carnitine	Gold	0-0.1 µmol/L	2-3 weeks	Referral	Guy's Hospital Genetics Centre
β-Carotene	Gold	0.19-1.58 µmol/L	4 weeks	Referral	St Helier Hospital
CEA	Gold	<5 µg/L (non-smokers) <10 µg/L (smokers)	Within 24hrs	Yes	Can be raised in alcoholic liver disease, cirrhosis, pancreatitis, inflammatory lung disease, Crohn's disease and ulcerative colitis
Chloride	Gold	95-108 mmol/L	Within 24hrs	Yes	
Cholesterol	Gold	<5.0 mmol/L desirable	Within 24hrs	Yes	
HDL Cholesterol	Gold	>1.0 mmol/L desirable	Within 24hrs	Yes	Fasting
LDL Cholesterol	Gold	<3.0 mmol/L desirable	Within 24hrs	Yes	Fasting. Friedwald equation. Invalid if triglycerides >4.4 mmol/L
Cholinesterase	Gold	600-1400 u/L	4-5 weeks	Referral	Synnovis (GSTS)
Dibucaine Number	Gold	76-83	4-5 weeks	Referral	Synnovis (GSTS)
Fluoride Number	Gold	<50	4-5 weeks	Referral	Synnovis (GSTS)
Ro 02-0683 Number	Gold	93-98	4-5 weeks	Referral	Synnovis (GSTS)
Red Cell Cholinesterase	Purple	7524-13323 u/L	2-3 Weeks	Referral	Cardiff Toxicology. Please see Appendix ii for sample requirements

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Chromogranin A	Purple	<60 pmol/L	3-4 weeks	Referral	Performed at Charing Cross Hospital. Please see Appendix ii for sample requirements
Chromogranin B	Purple	<150 pmol/L	3-4 weeks	Referral	Performed at Charing Cross Hospital. Please see Appendix ii for sample requirements
Chromium (whole blood)	Purple	<40 nmol/L	2-3 Weeks	Referral	Performed at Synnovis (KCH)
Cobalt (whole blood)	Purple	<10 nmol/L	2-3 Weeks	Referral	Performed at Synnovis (KCH)
Copper	Gold	12.0-25.0 µmol/L	2 Weeks	Referral	Performed at East Kent University Hospitals NHS Trust
Cortisol 9AM	Gold	185-624 nmol/L	Within 24hrs	Yes	
Creatinine	Gold	Male: 59-104 µmol/L Female: 45-84 µmol/L < 4 weeks 27-87 µmol/L 4 weeks to < 1 year 14-34 µmol/L Child (1-10): 23-68 µmol/L	Within 24hrs	Yes	
Creatine Phosphokinase (CPK)	Gold	Male: Adult 40-320 U/L 60-305 U/L <4 years 75-230 U/L 4 yrs to < 7 yrs 60-365 U/L 7 yrs to < 9 yrs 55-215 U/L 9 yrs to < 12 yrs 60-230 U/L 12yrs to <14 yrs 60-335 U/L 14yrs to < 16yrs 55-370 U/L 16yrs to < 19yrs Female: Adult 25-200 U/L 60-305 U/L <4 years 75-230 U/L 4 yrs to < 7 yrs 60-365 U/L 7 yrs to < 9 yrs 80-230 U/L 9 yrs to < 12 yrs 50-295 U/L 12yrs to < 14yrs 50-240 U/L 14yrs to < 16yrs 45-230 U/L 16yrs to < 19yrs	Within 24hrs	Yes	

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Dehydroepiandrosterone Sulphate (DHEAS)	Gold	Age and gender related reference ranges. See report	4-5 weeks	Referral	Performed at Synnovis (KCH)
Dihydrotestosterone	Gold	<1.27 nmol/L adult females 0.86 – 3.40 nmol/L adult males	3-4 weeks	Referral	Performed at Synnovis (GSTS)
Estimated GFR	Gold	mL/min/1.73m ²	Within 24hrs	Yes	Not validated in patients <18 yrs, pregnant women.
Ferritin	Gold	Male: 24-337 ug/L Female: 11-307 ug/L	Within 24hrs	Yes	
Folate	Gold	3-20 ug/L	Within 24hrs	Yes	
FSH	Gold	Female: Follicular phase:2.5-10.2 IU/L, Mid-cycle:3.4-33.4 IU/L, Luteal:1.5-9.1IU/L, Post menopausal:>30 IU/L. Male:1.5-18.0 IU/L	Within 24hrs	Yes	Day 2-5 of cycle
Fructosamine	Gold	0-286 µmol/L	2-3 weeks	Referral	Performed at Synnovis (GSTS)
Galactose-1-phosphate uridyl transferase	Green	Normal 20.2-46.4 □mol/hr/gHb	2-3 weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements
α-Galactosidase A	Green	8.9-39 nmol/hr/mL	4-5 weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements
Gastrin	Purple	<40 pmol/L	3-4 weeks	Referral	Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements. Discontinue H ₂ antagonists for 48 hours, and PPIs for two weeks.
Glucagon	Purple	<50 pmol/L	3-4 weeks	Referral	Imperial College Healthcare NHS Trust. Sample to be taken on ice.
Glucose (Fasting)	Grey	3.5-6.0 mmol/L	Within 24hrs	Yes	

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Glucose Tolerance Test (2 hour value)	Grey	Up to 7.7 mmol/L – Normal 7.8 – 11.0 mmol/L – Impaired glucose tolerance >11.0 mmol/L - Diabetic	Within 24hrs	Yes	Available only Monday to Friday Appointment required (ext 5391 for Dartford, 01634 830000 ext 3774 for Medway) Different cut-offs apply for antenatal GTTs.
γ -Glutamyl Transferase (γ -GT)	Gold	Male: < 55 U/L Female: < 38 U/L Male children 1–182 days: 12-122 U/L 183–365 days: 1-39 U/L 1–12 years: 3-22 U/L 13–18 years: 2-42 U/L Female children 1–182 days: 15-132 U/L 183–365 days: 1-39 U/L 1–12 years: 4-22 U/L 13–18 years: 4-24 U/L	Within 24hrs	Yes	
Growth Hormone	Gold	Contact lab	2-3 weeks	Referral	Performed at East Kent University Hospitals NHS Trust Please see Appendix ii for sample requirements
HbA _{1c} (IFCC aligned)	Purple	20-41mmol/mol Non Diabetic range	Within 72hrs	Yes	Target value for good control is 48-59. Note: The level of risk for the pregnancy for women with pre-existing diabetes increases with an HbA1C level above 48 mmol/mol (NICE 2015)
Homocysteine	Purple	5-15 μ mol/L	3-4 weeks	Referral	Brighton and Sussex Royal University Hospitals. Causes of increased values include non-fasting, delay in separation, renal impairment, B ₁₂ and folate deficiency
HCG β	Red/Gold	Result used for risk calculation within Viewpoint software.	Within 24hrs	Awaiting assessment	Run for first trimester screening only. Run at Medway Maritime Hospital.

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Human Chorionic Gonadotrophin (HCG - Total)	Gold	0-5 IU/L	Within 24hrs	Yes	
IgA	Gold	g/L Adults: 0.7 – 4.0 Children: 0-2 weeks: 0.01-0.08 2-6 weeks: 0.02-0.15 6-12 weeks: 0.05-0.4 3-6 months: 0.10-0.5 6-9 months: 0.15-0.7 9-12 months: 0.20-0.7 1-2 years: 0.3-1.2 2-3 years: 0.3-1.3 3-6 years: 0.4-2.0 6-9 years: 0.5-2.4 9-12 years: 0.7-2.5 12-15 years: 0.8-2.8	7 days	Yes	
IgG	Gold	g/L Adults: 7 – 16 Children: 0-2 weeks: 5.0-17.0 2-6 weeks: 3.9-13.0 6-12 weeks: 2.1-7.7 3-6 months: 2.4-8.8 6-9 months: 3.0-9.0 9-12 months: 3.9-10.9 1-2 years: 3.1-13.8 2-3 years: 3.7-15.8 3-6 years: 4.9-16.1 6-15 years: 5.4-16.1	7 days	Yes	

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
IgM	Gold	g/L Adults: 0.4 – 2.3 Children: 0-2 weeks: 0.05-0.2 2-6 weeks: 0.08-0.4 6-12 weeks: 0.15-0.7 3-6 months: 0.2-1.0 6-9 months: 0.4-1.6 9-12 months: 0.6-2.1 1-3 years: 0.5-2.2 3-6 years: 0.5-2.0 6-12 years: 0.5-1.8 12-15 years: 0.5-1.9	7 days	Yes	
IgE	Gold	0-11 KU/L <12 weeks 0-29 KU/L 12 weeks to < 1 years 0-52 KU/L 1 years to < 5 years 0-63 KU/L 5 years to < 10 years 0-75 KU/L 10 years to < 15 years 0-81 KU/L 15 years to > 15 years	2 weeks	Referral	East Kent University Hospitals NHS Trust. Please see Appendix ii for sample requirements
IL-6	Gold	0-7 pg/mL	6 weeks	Referral	PRU Sheffield. Please see Appendix ii for sample requirements
Inhibin A	Gold	Post-menopausal 0-3.6 pg/mL Premenopausal 5-160 pg/mL	3-4 weeks	Referral	PRU Sheffield

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Inhibin B	Gold	Post-menopausal 0-5 pg/mL Premenopausal 5-200 pg/mL	3-4 weeks	Referral	PRU Sheffield
Insulin	Gold	18-173 pmol/L	2-3 Weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements
Insulin-like Growth Factor-1 (IGF-1)	Gold	Male: (all nmol/L) <4 yrs 3.6-14.8 4yrs to <7 years 7.1-26.8 7 to <10 years 11.1-32.3 10 to <14 years 15-64.8 14 to <19 years 32.1-62.6 19 to <23 years 24.4-52 23 to <38 years 12.5-29.6 38 to <53 years 11.5-27.3 >53 years 7.1-24.1 Female: (all nmol/L) <4 yrs 4.4-22.3 4 to <7 years 10.4-31.7 7 to <10 years 11.4-51.9 10 to <14 years 24.5-66.3 14 to <19 years 34.8-61.2 19 to <23 years 19.4-43.2 23 to <38 years 14-32.1 38 to <53 years 12.1-31.8 >53 years 7.0-26.6	2-3 Weeks	Referral	Performed at East Kent University Hospitals
IGF Binding Protein 3	Gold	mg/L (Age and gender related please see report)	2-3 Weeks	Referral	Performed at Synnovis (King's)
Iron	Gold	Male: 12-32 µmol/L Female: 11-32 µmol/L Newborn: 18-45 µmol/L Infant: 7-18 µmol/L Child: 9.0-22 µmol/L	Within 24hrs	Yes	Haemolysed samples unsuitable

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Lactate	Grey	0.5-2.2 mmol/L <16 years 0.6-2.5 mmol/L	Within 24hrs	Yes	Transport to laboratory immediately
Lactate Dehydrogenase (LDH)	Gold	Adults: 208- 378 U/L Children: 1 day: < 1327 U/L 2-5 days: < 1732 U/L 6 days-6 months: < 975 U/L 4-6 years: < 615 U/L	Within 24hrs	Yes	
Lead	Purple	<0.5 µmol/L < 18 years <0.7 µmol/L 18 years to >18 years	2-3 weeks	Referral	Performed at Synnovis (KCH). Please see Appendix ii for sample requirements
LH	Gold	Female: Follicular phase:1.9-12.5 IU/L, Mid-cycle:8.7-76.3 IU/L, Luteal:0.5-16.9 IU/L, Postmenopausal :> 16 IU/L. Male: 20-70 yrs: 1.5-9.3 IU/L >70yrs: 3.1-34.6 IU/L	Within 24hrs	Yes	Day 2-5 of cycle
Light Chains (Kappa)	Gold	3.30-19.40 mg/L	2-3 weeks	Referral	Performed at Synnovis (GSTS) for Dartford At Birmingham - Medway
Light Chains (Lambda)	Gold	5.71-26.30 mg/L	2-3 weeks	Referral	Performed at Synnovis (GSTS) for Dartford At Birmingham - Medway
Kappa: Lambda ratio	Gold	0.26-1.65	2-3 weeks	Referral	Performed at Synnovis (GSTS) for Dartford At Birmingham - Medway
Macroprolactin	Gold	Semi quantitative report	3-4 weeks	Referral	Synnovis
Magnesium	Gold	<4 weeks 0.6-1.00 mmol/L 4 weeks to > 4 weeks: 0.7-1.0 mmol/L	Within 24hrs	Yes	
Manganese	Dark Blue	9-24 nmol/L	2-3 weeks	Referral	Performed at Synnovis (KCH)
Mercury	Purple	0-10 ug/L	3-4 weeks	Referral	Performed at Synnovis (KCH). Please see Appendix ii for sample requirements

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Metanephrine (plasma)	Purple	<510 pmol/L (seated) <450 pmol/L (supine)	7 days	Referral	Performed at East Kent University Hospitals. Please see Appendix ii for sample requirements
Methylmalonic acid	Purple	64 years to > 64 years: 0-360 nmol/L <64 years: 0-280 nmol/L	2-3 Weeks	Referral	Performed at Synnovis (GSTS)
Normetanephrine (plasma)	Purple	<1180 pmol/L (seated) <750 pmol/L (supine)	7 days	Referral	Performed at East Kent University Hospitals. Please see Appendix ii for sample requirements
Neurone Specific Enolase (NSE)	Gold	0-12.5 µg/L	2 Weeks	Referral	PRU Sheffield
Osmolality	Gold	275-295 mosm/kgH ₂ O	Within 24hrs	Yes	
Oestradiol	Gold	Females: 55 - 422pmol/L follicular 118 - 1897pmol/L mid cycle 134 - 903pmol/L luteal	Within 24hrs	Yes	
Pancreatic Polypeptide	Purple	<300 pmol/L	3-4 weeks	Referral	Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements
PAPP-A (Pregnancy associated plasma protein A)	Red/Gold	Result used for risk calculation within Viewpoint software.	Within 24hrs	Awaiting assessment	Run for first trimester screening only. Run at Medway Maritime Hospital.
Parathyroid Hormone (PTH)	Pink (7ml)	12-88 ng/L	2 weeks	Yes	Transport to laboratory immediately.
Phosphate	Gold	16 years to >16 years 0.80-1.50 mmol/L <4 weeks: 1.3-2.6 mmol/L 4 weeks to <1 year: 1.3-2.4 mmol/L 1 year to <16 yrs: 0.9-1.8 mmol/L	Within 24hrs	Yes	Positive interference with haemolysis

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Placental Alkaline Phosphatase	Gold	0-0.5 U/L	2-3 weeks	Referral	PRU Sheffield
Potassium	Gold	3.5-5.3 mmol/L	Within 24hrs	Yes	Positive interference with haemolysis, delayed separation of serum and EDTA contamination
Pre-Eclampsia Ratio (sFlt-1(pg/mL) & PLGF (pg/mL) tests and calculated ratio)	Gold	Refer to latest NICE guidelines	Within 24hrs	Yes	Only ratio reported to clinicians. Consultant only request, requests are vetted prior to analysis Only available to patients from FMU hypertension clinic (Medway)
Procalcitonin (PCT)	Gold	0 – 0.5ng/mL	Within 4hrs	Yes	Critical care patients only, test not repeated within 48hrs.
Procollagen III	Gold	1.2-4.2 µg/L (>20 years)	2-3 weeks	Referral	Performed at Synnovis (GSTS)
Progesterone	Gold	Male: 0.2-4.40 nmol/L Female: (Mid follicular): 0.5-3.2 nmol/L (Mid Luteal) : 12-49 nmol/L (Post Menopause): 0.2-1.5 nmol/L Normal range - 1st /2nd Trimester : 10 - 149 / 52 - 132 nmol/L	Within 24hrs	Yes	
Proinsulin	Gold	<10 pmol/L	3 Weeks	Referral	Guilford. Please see Appendix ii for sample requirements
Prolactin	Gold	Male: 56-278 mIU/L Female: Pre menopause: 70-566 mIU/L Post menopause: 58-416 mIU/L	Within 24hrs	Yes	Day 2-5 of cycle

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Prostate Specific Antigen	Gold	40 to 49 yrs : <2.5 µg/L 50-69 yrs : <3.0 µg/L 70-79 yrs : <5.0 µg/L ≥80yrs : <10 µg/L	Within 24hrs	Yes	Increased by prostatitis, digital rectal examination. Local Urology guideline age adjusted PSA normal values.
Protein Electrophoresis	Gold	Pattern reported	7 days	Yes	
Plasma Renin Activity* *Note different sample types on each site	Green (DVH) Purple (Medway)	Random 0.5-3.5 nmol/L/h	6 weeks	Referral	Dartford - Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements Medway – Synnovis (KCH)
Aldosterone/Renin ratio	Green	<680 Conn's unlikely >850 Possible Conn's >1700 Conn's very likely	6 weeks	Referral	Dartford - Imperial College Healthcare NHS Trust Medway – Synnovis (KCH) Please see Appendix ii for sample requirements. Spironolactone must be discontinued for at least six weeks, β-blockers for two weeks.
Selenium	Dark Blue	16 years and > 16 years: 0.90-1.67 µmol/L < 16 years: 0.45-1.47 µmol/L	2-3 weeks	Referral	Performed at Synnovis (KCH)
Serum Amyloid A	Gold	<10 mg/L	2-3 Weeks	Referral	Performed at Synnovis (GSTS)
Sex Hormone Binding Globulin (SHBG)	Gold	10-80 nmol/L male 20-130 nmol/L female (non pregnant)	8 days	Yes	
Sodium	Gold	133-146 mmol/L	Within 24hrs	Yes	
Somatostatin	Purple	<150 pmol/L	3-4 weeks	Referral	Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements
Testosterone	Gold	male ≥17 years 8.4-27.4 nmol/L fem. ≥17 years 0.5-2.5 nmol/L	Within 24hrs	Yes	
Free Testosterone	Gold	10-50 pmol/L female 134-844 pmol/L male	5 days	Yes	Calculated test

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Thioguanine Nucleotides (TGN)	Purple (x2)	Refer to report	2-3 Weeks	Referral	Performed at Synnovis (GSTS). Requires funding prior to referral. Please see Appendix ii for sample requirements
Thiopurine Methyltransferase (TPMT)	Purple (x2)	26-50 pmol/hr/mgHb 10-25 pmol/hr/mgHb carrier <10 pmol/hr/mgHb deficient	2-3 Weeks	Referral	Performed at Synnovis (Purine Laboratory GSTS). Please see Appendix ii for sample requirements. Haemolysis invalidates. Transfusion in past 3 months may mask deficiency.
Total Protein	Gold	60-80 g/L	Within 24hrs	Yes	
Thyroglobulin	Gold	<0.14ug/L	7 days*	Referral	Performed at East Kent University Hospitals (usually once per week – Wednesday). Serum should be separated within 8hrs, stable in fridge for 3 days. Sent to Birmingham for confirmation if TgAb is positive (>5kU/L). *TaT extended in this instance.
Thyroglobulin Antibody	Gold		7 days	Referral	Performed at East Kent University Hospitals
Free T4	Gold	7.7-20.6 pmol/L	Within 24hrs	Yes	
Free T3	Gold	4.2-6.9 pmol/L	Within 24hrs	Yes	
TSH	Gold	0.30-4.8 mIU/L	Within 24hrs	Yes	
Thyroid Receptor Antibodies	Gold	Refer to report	2-3 Weeks	Referral	Performed at Sheffield.
Thyroid Peroxisomal Antibodies (TPO)	Gold	<9 IU/mL	7 days	Yes	
Transferrin	Gold	Adult 2.0-3.6 g/L Up to 10 years old 1.3-3.6 g/L	Within 24hrs	Yes	
Transferrin Saturation	Gold	Percentage Saturation = 20-50%	Within 24hrs	Yes	
Triglycerides	Gold	Up to 1.7 mmol/L desirable	Within 24hrs	Yes	Fasting
Troponin I (hsTNI)	Green (heparin)	0-17.5 ng/L	Within 24hrs	Yes	Ensure to interpret alongside signs and symptoms and ECG results. Normally only available for ED and Inpatients. Part of urgent workstream(1hr turnaround time)

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Tryptase	Gold	2-14 µg/L	2-3 Weeks	Referral	Performed at Synnovis (GSTS) Take sample as soon after anaphylactic shock as possible, then at +2 hours and + 8 hours.
Urea	Gold	16 years to > 16 years : 2.5-7.8 mmol/L <4 weeks: 0.8-5.5 mmol/L 4 weeks to <1 year: 1.0-5.5 mmol/L 1 to <16 yrs: 2.5-6.5 mmol/L	Within 24hrs	Yes	
Uric Acid	Gold	Male: 200-430 µmol/L Female:140-360 µmol/L	Within 24hrs	Yes	
Vitamin A	Green	µmol/L <3 yrs: 0.49-1.43 3 to <6 yrs 0.56-1.47 6 to <9 yrs 0.66-2.00 9 to <12 yrs 0.77-2.06 12 to <14 yrs 0.84-2.20 14 to <16 yrs 0.94-2.65 ≥ 16 years: 1.40-3.84	3-4 Weeks	Referral	Performed at Synnovis (GSTS) Please see Appendix ii for sample requirements
Vitamin B1	Purple	65-200 nmol/L	3-4 weeks	Referral	Performed at Synnovis (GSTS) Please see Appendix ii for sample requirements. Fasting
Vitamin B2	Purple	175-450 nmol/L	3-4 weeks	Referral	Performed at Synnovis (GSTS) Please see Appendix ii for sample requirements. Fasting
Vitamin B6	Purple	35-110 nmol/L	3-4 weeks	Referral	Performed at Synnovis (GSTS) Please see Appendix ii for sample requirements. Fasting
Vitamin B12	Gold	145-914 ng/L	Within 24hrs	Yes	
Vitamin D (25OH-Vit D)	Gold	< 25 nmol/L: Deficiency 25 -50 nmol/L: Insufficiency >50 nmol/L :Sufficiency	Within 24hrs	Yes	

Test	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Vitamin E	Green	<3 yrs 0-25 µmol/L 3 to <6 yrs 7-30.1 µmol/L 6 to <9 yrs 10-34.8 µmol/L 9 to <12 yrs 13.9-32.5 µmol/L 12 to <14 yrs 10.9-34.8 µmol/L 14 to <16 yrs 13.9-32.5 µmol/L 16 years to >16 years:11.6-41.8 µmol/L	3-4 Weeks	Referral	Performed at Synnovis (GSTS) Please see Appendix ii for sample requirements
Vasoactive Intestinal Polypeptide (VIP)	Purple	<30 pmol/L	3-4 weeks	Referral	Imperial College Healthcare NHS Trust. Please see Appendix ii for sample requirements.
Zinc	Dark Blue	11-19 µmol/L	2-3 weeks	Referral	Performed at Synnovis (KCH)
Therapeutic Drugs	Sample type	Therapeutic Range	Turnaround Times (TAT)	UKAS scope	Comments
Amiodarone	Gold	0.6-2.5 mg/L	2-3 weeks	Referral	Synnovis (GSTS)
Carbamazepine	Gold	4.0-12.0 mg/L	7 days	Yes	
Cyclosporin	Purple	Patient dependent, please see report.	14 days	Referral	Performed at Synnovis
Digoxin	Gold	0.8-2.0 µg/L	7 days	Yes	Take sample at least 6 hours post-dose
Ethosuximide	Gold	40-80 mg/L	4-6 weeks Awaiting confirmation	Referral	Epilepsy Society, Buckinghamshire.
Flecainide	Gold	See referral report	3-4 weeks Awaiting confirmation	Referral	St George's Hospital

Therapeutic Drugs	Sample type	Therapeutic Range	Turnaround Times (TAT)	UKAS scope	Comments
Gentamicin	Gold	Refer to Microbiology Trust Guidance.	Within 24hrs	Yes	Test run for Microbiology, advice on interpretation available from Consultant Microbiologist.
Gabapentin	Gold	2-20 mg/L	2 Weeks	Referral	Epilepsy Society, Buckinghamshire.
Hydroxycarbamazepine	Gold	15-35 mg/L	3 Weeks	Referral	Performed at Synnovis (GSTS)
Lacosamide	Gold	10-20mg/L	2 weeks	Referral	Epilepsy society, Buckinghamshire. Sample should be taken immediately before an oral dose.
Lamotrigine	Gold	1-15 mg/L	2-3 weeks	Referral	Performed at Synnovis (KCH)
Levetiracetam	Gold	12-46 mg/L	2 Weeks	Referral	Epilepsy Society, Buckinghamshire.
Lithium	Gold	0.4-1.0 mmol/L (Chronic Rx)	7 days	Yes	Take sample 12 hours post-dose
Mycophenolic Acid (MPA)	Purple	Please see report or contact referral laboratory	14 days	Referral	Performed at Synnovis
Paracetamol	Gold	No reference range mg/L	Within 24hrs	Yes	
Phenobarbitone	Gold	20-40 mg/L	2-3 Weeks	Referral	Performed at Synnovis
Phenytoin	Gold	5-20 mg/L	7 days	Yes	
Salicylate	Gold	No reference range mg/L	Within 24hrs	Yes	
Sirolimus	Purple	Please see report or contact referral laboratory	14 days	Referral	Performed at Synnovis
Tacrolimus (FK506)	Purple	Please see report or contact referral laboratory	14 days	Referral	Performed at Synnovis
Theophylline	Gold	10-20 mg/L	Within 24hrs	Yes	
Topiramate	Gold	5-20 mg/L	3 Weeks	Referral	Epilepsy Society, Buckinghamshire.
Valproic Acid	Gold	50-100 mg/L	7 days	Yes	
Vancomycin	Gold	Refer to Microbiology Trust Guidance.	Within 24hrs	Yes	Test run for Microbiology, advice on interpretation available from Consultant Microbiologist.
Vigabatrin	Gold	5-35 mg/L	2 Weeks	Referral	Epilepsy Society, Buckinghamshire.
Urine Chemistry	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Adrenaline	24 hour	0-0.10 µmol/24 hrs	2-3 Weeks	Referral	Epsom and St Helier NHS Trust Acidified urine required. Please see Appendix ii for sample requirements.

Urine Chemistry	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Urine Amylase	White top universal	Not stated	Within 24hrs	Yes	
Albumin:Creatinine ratio	Urine vacutainer	<2.5mg/mmol Creat. male <3.5mg/mmol Creat.Female	Within 24hrs	Yes	
Amino Acid Chromatography	White top universal	Pattern reported	3-4 Weeks	Referral	Performed at Synnovis (GSTS). Only applicable for cystinuria screen or investigation of tubular pathology. Please request plasma amino acids for investigation of other inherited metabolic conditions. Please see Appendix ii for sample requirements
Bence Jones protein	White top universal or urine vacutainer	Presence or absence reported	2 Weeks	Yes	White top universal container
C-Peptide	Red top boric acid. (approx. 2hrs post prandial)	C-peptide creatinine ratio (UCPCR): Urine Exeter Clinical Laboratory International (exeterlaboratory.com)	7 days	Referral	Exeter Clinical Laboratory International Freeze if unable to send immediately. Send ambient post.
Calcium	24 hour	2.5-7.5 mmol/24 hrs	Within 24hrs	Yes	
Citrate	24 hour	Males: 0.6-4.8 mmol/24 hrs Female: 1.3-6.0 mmol/24 hrs	4-5 weeks	Referral	East Kent University Hospitals NHS Trust. Acidified urine required. Please see Appendix ii for sample requirements
Copper	24 hour	0-0.9 µmol/24 hrs	2-3 Weeks	Referral	Performed at Synnovis (KCH). Acid washed bottle required Please see Appendix ii for sample requirements
Free Cortisol (Urine)	24 hour	0-200 nmol/24 hrs	4 weeks	Referral	East Kent University Hospitals NHS Trust. Please see Appendix ii for sample requirements

Urine Chemistry	Sample type	Biological Reference Interval	Turnaround Times (TAT)	UKAS scope	Comments
Creatinine	24 hour	Male: 7-18 mmol/24 hrs Female: 5-16 mmol/24 hrs None for Paediatric (<16 yrs)	Within 24hrs	Yes	
Cystine	24 hour	4-15 µmol/mmol Creatinine	3-4 Weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements Amino acid Chromatography/Cystine)
Dopamine	24 hour	0-2.5 mmol/24 hrs	2-3 weeks	Referral	Epsom and St Helier NHS Trust Acidified urine required. Please see Appendix ii for sample requirements.
Drug of Abuse Screen	White top universal		2-3 weeks	Referral	Performed at Synnovis (KCH). Please see Appendix ii for sample requirements
Glycosaminoglycan: Creatinine ratio	White top universal	0-1 yr 2-30 1-3 yrs 2-18 3-5 yrs 2-13 5-15 yrs 1-10 >15 yrs 1-6	5-6 Weeks	Referral	Guy's Hospital Genetics Centre, if mucopolysaccharide screen positive
5 HIAA	24 hour	<50 µmol/24 hrs	2 weeks	Yes	Acidified urine required
HVA	24 hour	0-44 µmol/24 hrs	2 weeks	Referral	Acidified urine required Epsom and St Helier NHS Trust
Magnesium	24 hour	2.4-6.5 mmol/24 hrs	Within 24hrs	Yes	
Metadrenaline	24 hour	<1.20 µmol/24 hrs	2-3 weeks	Yes	Acidified urine required
Normetadrenaline	24 hour	<3.30 µmol/24 hrs	2-3 weeks	Yes	Acidified urine required
Total Metadrenalines	24 hour	<4.50 µmol/24 hrs	2-3 weeks	Yes	Acidified urine required
Noradrenaline	24 hour	0-0.60 µmol/24 hrs	2-3 weeks	Referral	Epsom and St Helier NHS Trust Acidified urine required. Please see Appendix ii for sample requirements.
N-Terminal Telopeptide Collagen I Cross-Links (NTx)	White top universal	3-63 nmol BCE/mmol creatinine male 5-65 nmol BCE/mmol creatinine female BCE = Bone Collagen Equivalentents	5-6 Weeks	Referral	Performed at Synnovis (KCH)

<u>Urine Chemistry</u>	Sample type	<u>Biological Reference Interval</u>	Turnaround Times (TAT)	UKAS scope	Comments
Organic Acids	White top Universal	Pattern reported	3-4 weeks	Referral	Performed at Synnovis (GSTS)
Osmolality	White top universal	400 -1400 mosmol/kg H ₂ O	Within 24hrs	Yes	
Oxalate	24 hour	0.08-0.49 mmol/24 hrs male 0.04-0.32 mmol/24 hrs female	4-5 Weeks	Referral	East Kent University Hospitals NHS Trust. Acidified urine required. Please see Appendix ii for sample requirements
pH	White top universal	No reference range stated.	Within 72hrs	Yes	Sample must be refrigerated or tested within 4hrs samples received after this time will be unsuitable. Samples can be refrigerated for up to 24hrs and frozen for up to 72hrs.
Phosphate	24 hour	15-50 mmol/24 hrs	Within 24hrs	Yes	
Potassium	24 hour	25-125 mmol/24 hrs	Within 24hrs	Yes	
Protein	24 hour	0.05-0.25 g/24 hrs	Within 24hrs	Yes	Random Protein/Creatinine ratio suitable for most patients.
Protein:Creatinine ratio	Urine vacutainer	3-14 mg/mmol Creatinine	Within 24hrs	Yes	
Sodium	24 hour	40-220 mmol/24 hrs	Within 24hrs	Yes	
Steroid profile	24 hour	Pattern reported	3-4 Weeks	Referral	Performed at Synnovis (KCH)
Urea	24 hour	250-570 mmol/24 hrs	Within 24 hours	Yes	
Uric Acid	24 hour	1.5-4.5 mmol/24 hrs	Within 24 hours	Yes	
VMA	24 hour	<35 µmol/24 hrs	2-3 weeks	Referral	Please see Appendix ii for sample requirements. Acidified urine required.
VMA: Creatinine ratio	White top Universal	Age related reference ranges. See report	2-3 weeks	Referral	St Thomas' Hospital. Urine acidified upon receipt in laboratory.
<u>Calculus</u>		<u>Biological Reference Interval</u>			
Stone screening	White top Universal		2-3 Weeks	Referral	Performed at UCLH.

<u>CSF Chemistry</u>		<u>Biological Reference Interval</u>			
ACE	White top Universal	0 – 1.2uM/min/L	4-5 Weeks	Referral	Performed at National Hospital for Neurology, Queen's Square. Please see Appendix ii for sample requirements
Glucose	Fluoride (grey)	2.2-3.9 mmol/L	Within 24hrs	Yes	
Lactate	Fluoride (grey)	Neonate: 1.1 – 6.7 mmol/L 3 – 10 days: 1.1– 4.4 mmol/L >10 days: 1.1 – 2.8 mmol/L Adult: 1.1 – 2.4 mmol/L	Within 24hrs	Yes	
Protein	White top Universal	Adults: 0.15-0.45 g/L (newborn <1month) 0.15 – 1.30 g/L	Within 24hrs	Yes	
Oligoclonal Bands	White top Universal	Pattern reported	2-3 weeks	Referral	Performed at Synnovis (GSTS). Please see Appendix ii for sample requirements, Paired Serum also required for comparison.
β-2 Transferrin (Tau protein)	White top Universal	Presence or absence reported	2-3 weeks	Referral	PRU Sheffield
Xanthochromia Protect from light (brown envelope or black bag)	White top Universal Minimum 500uL required	Presence or absence of bilirubin and oxyhaemoglobin reported	< 4 hours (see comments)	Yes	If received between 10am-4pm Monday to Friday. If received out of these hours it is processed the next routine working day of the laboratory. Separate sample pot from chemistry and microbiology.
<u>Sweat Chemistry</u>	Sample type	<u>Biological Reference Interval</u>	Turnaround Times (TAT)	UKAS scope	Comments
Chloride	Specialist collection device.	>60mmol/L supports the diagnosis of CF. 40-60mmol/L (or if <6months age 30-60mmol/L) intermediate result. <40nmol/L (or <30nmol/L in patients <6months old) CF is unlikely	7 days	Yes	Sweat samples can only be collected by trained personnel

<u>Faecal Chemistry</u>	Sample type	<u>Biological Reference Interval</u>	Turnaround Times (TAT)	UKAS scope	Comments
Calprotectin	Blue stool pot	<50 µg/g stool	2 weeks	Referral	Performed at Maidstone Hospital (MTW)
Elastase 1	Blue stool pot	>200 µg/g stool - Normal	3-4 Weeks	Referral	Performed at Synnovis (KCH)
Total Porphyrins (protect from light)	Blue stool pot	<50 nmol/g stool	3-4 Weeks	Referral	Performed at Synnovis (KCH). Please see Appendix ii for sample requirements
qFIT (Quantitative faecal immunotest)	Specific qFIT sample pot	Refer to report	2 weeks	Referral	Performed at Maidstone Hospital (MTW)

NB. The above is not a complete list of all tests performed. Further information for less common tests is available from the Main Laboratory.

8.2 Automated Request Intervention Rules

The laboratory Telepath computer has a feature called Request Intervention, by which rules are set prohibiting repeat testing of certain analytes during a certain period. The analytes involved, and the limits set, are RCPATH recommended and given below. If such a request is made, the computer will generate a report stating that the request is invalid and giving the previous result.

Request intervention does not apply to requests from Accident & Emergency, ITU, HDU and the Children's Directorate. If a clinician wishes to override the rule, the laboratory must be contacted with the reason for the request. Such requests are to be made by registrar grade or above.

Test	Time before repeat permitted (days)
α -1 Antitrypsin	120
ALP isoenzymes	120
B12/Folate	60
B2M	90
Bence Jones protein	40
BNP	365
Cholesterol	90
Cholinesterase	365
Complement C3/C4	120
Copper/Caeruloplasmin	120
CRP	1
DPYD	Not necessary to repeat
Faecal Calprotectin	90
Faecal Elastase	180
HbA _{1c}	90
Iron/Transferrin	30
Liver Profile	48hr
Paraprotein/Electrophoresis	90 (Cons. Haematologists exempt)
Pre- eclampsia ratio	14
Procalcitonin	48hr
PSA	30
QFIT	28
TDM (Carbamazepine, Valproate, Digoxin, Phenytoin & Phenobarbitone)	7
Theophylline	3
Thyroid Function	30
Thyroid Peroxisomal Ab	365
TPMT	365 not usually necessary to repeat at all unless patient had blood transfusion very recently prior to sample.
Tumour Markers (AFP, CA125, CEA, CA153, CA199)	30
Vitamin D	90
Zinc	14

8.3 LABORATORY PROFILES

Kidney profile – Sodium, potassium, creatinine, eGFR, AKI (Urea is also routinely given for inpatients at Medway only)

Liver profile – Albumin, total bilirubin, ALT, alkaline phosphatase

Bone profile – Albumin, calcium, phosphate, alkaline phosphatase, adjusted calcium

Lipid profile (fasting) – Cholesterol, triglycerides, HDL cholesterol, LDL cholesterol, total C:HDLC ratio

Thyroid function – TSH as first line test, with Free T4 and Free T3 added as appropriate depending on the TSH level

Protocols for Chemical Pathways are reviewed by the Chemical Pathologist and are available on ADAGIO.

Appendix i: Critical Values

The below results are critical; those in the column marked 'Red limits' must be phoned immediately to the requestor including the GP out of services and all other users served by the trust, those in the column marked 'Amber limits' must be phoned at the next available opportunity including within routine working hours i.e. for a GP practice or outpatient department.

For a few analytes there are differences in the critical phoning limits for a sample from DVH and MMH. These exist due to the laboratories serving two different NHS Trusts and the users having different requirements for the telephoning of these results.

For some results for the Emergency Department at MMH are communicated directly onto EPR - Troponin >17.5ng/L but <50ng/L are stated at 'Raised troponin (<50ng/L), please check iLab web'. Unsuitable samples such as grossly haemolysed samples for MMH ED only are also communicated in this way.

		Amber Action Limits Phone at next available opportunity in routine hours (within 24 hours)		Red Action Limits Phone immediately (within 2 hours)	
Analyte	Units	Equal to or Below	Equal to or Above	Equal to or Below	Equal to or Above
Sodium	mmol/L	125 (GP and OP only)		120 (130 if <16yrs)	160
Potassium	mmol/L		6.0 (GP and OP only) Also phone AKI 1	2.5	6.5 Also phone AKI 1
Urea	mmol/L				30 (>10 if <18yrs) >50 Renal Patient
Creatinine	µmol/L				350 (≥200 if <18yrs) ≥1200 Renal Patient
AKI	Stage		1 if K >6.0		1 if K >6.5 2 if new occurrence 3 if new occurrence
Glucose	mmol/L			2.5	25 (15 if <16 yrs)
Obstetric GTTs MMH		Fasting is ≥5.6 and/or 2hr value is ≥7.8mmol/L. Email medwayft.diabetesmidwife@nhs.net			
Obstetric GDM MMH		Early 8-12 weeks Fasting gluc ≥7.0, non fasting gluc ≥11.1, HbA1C ≥41 28 weeks Fasting gluc ≥5.3, non fasting gluc ≥9, HbA1C ≥39 Email medwayft.diabetesmidwife@nhs.net			
Calcium adj.	mmol/L		3	1.8	3.5
Magnesium	mmol/L			0.4	
Phosphate	mmol/L			0.3	
AST	U/L				601
ALT	U/L				525
Amylase	U/L				500
Total CK DVH	U/L				2500 (DVH)
Total CK MMH	U/L				5000 (MMH)
Conjugated Bilirubin	µmol/L				25 (Neonates only)
CRP	mg/L				300
Ethanol	mg/L				4000
Ammonia	µmol/L				100
Bile acids (pregnancy)	µmol/L		11		14
Bicarbonate	mmol/L			10	
Salicylate	mg/L				300
Paracetamol	mg/L				10
Triglyceride	mmol/L				20
BNP	pg/L		>400		
Troponin	ng/L		MMH >17.5, <50 add to EPR		50

TDMs, Hormones and Tumour Markers		Amber Action Limits Phone at next available opportunity within routine hours (within 24 hours)		Red Action Limits Phone immediately (within 2 hours)	
		Equal to or Below	Equal to or Above	Equal to or Below	Equal to or Above
Analyte	Units				
Carbamazepine	mg/L				25
Digoxin	µg/L				2.5
Theophylline	mg/L				25
Phenytoin	mg/L				25
Phenobarbitone	mg/L				70
Vancomycin	mg/L				25
Gentamicin	mg/L				2
Lithium	mmol/L				1.5
Cortisol (not DST)	nmol/L			50	
Cortisol (SST 30min)	nmol/L	250			
TSH	IU/L				>46 (and T4 <4.0)
FT4	pmol/L		35	<4.0	
FT3	pmol/L		10		
Paraprotein		As per SOP.BIO.4			
Tumour Markers		At Authorisers discretion			
Ca125 (Medway GPs only)	U/L	First ≥35 in GP Patient >50yrs email to ultrasound, described in IDOC.BIO.44			

Amber alerts to be phoned next working day, should always be telephoned with 24 hours.

Abnormal results that breach the amber alert limit on a Friday night, weekend, Bank Holiday should be telephoned to the out of hours service and not left until Monday/Tuesday.

During routine working hours: Results are telephoned to requesting location, with a few exceptions:

MMH Thyroid results do not need to be telephoned to Medway Nuclear Medicine, or if the requesting Clinicians are Dr Acosta and Dr Ryan.

MMH Critical alert procedure for inpatient AKI 2 or 3. All new AKI 2 and AKI 3 on an inpatient must be bleeped to the Acute Response Team (ART) on bleep **724**.

- Exceptions to this exist and these AKI results should be telephoned to that ward and given to a doctor: A&E, ITU, CCU, MHDU, Trafalgar

MMH: Outside of routine hours Bile Acids for Medway locations (e.g. Fetal Medicine or MCU) should not be telephoned to MEDDOC or 111. Please telephone these results through to the Maternity Triage.

Results are always telephoned to requesting location or 111/MEDOC out of hours, except where the test is a follow up of a previously abnormal result (unless repeat results show a markedly significant change for an individual). Telephoning limits in line with local guidelines and RCPATH Guidelines.

MMH : SBAR – A system to bleep critical results requiring immediate action, to doctors

The current limits and procedures for phoning abnormal results still exist
SBAR is a system for ensuring critical results; those that require immediate action/management of the patient are given to a doctor.
There are limits of results (in table below) that require SBAR to be initiated. Details of all attempts to relay an SBAR result must be recorded on the repeat board and in Telepath.
Contact switchboard on the general emergency number 3300, inform them you have an SBAR result and ask them to bleep the number on the request form. If there is no bleep number on the form ask switchboard to bleep the F1 for the requesting consultant's team.
When the bleep holder returns the call, ensure you take down their name and grade so you can record on Telepath. If there is no response from the first bleep, phone switchboard on 3300 and ask them to escalate the bleep to the next member of the team (F2, SpR & Consultant), until a response is obtained.

			Equal to or below	Equal to or above
RED ALERT BLOOD RESULTS FOR SBAR	Sodium	mmol/L	120	160
	Potassium	mmol/L	2.5	6.5
	Urea	mmol/L	-	30 (>10 if <16yrs)
	Creatinine	mmol/L	-	400(>200 if <16yrs)
	Glucose	mmol/L	2.5	25
	Corr Calcium	mmol/L	1.8	3.5
	Amylase	U/L	-	1000
	Digoxin	ug/L	-	Any Overdose
	Lithium	mmol/L		
	Carbamazepine,	mg/L		
Theophylline, Phenytoin, Phenobarbitone				
Paracetamol	mg/L	-	>100 at 4hrs	
			>25 at 12hrs	
			>25 if no time of ingestion/time unclear	
Salicylate	mg/L	-	>300	

ED – FIRST:	Phone Epic mobile 07788917062 or Bleep 790 (try twice)	Doctor in charge
If no response then:	Bleep 525	Nurse in charge
If no response then:	ext 6385	Nurse station (majors)
If no response then:	Ext 4981/4988	Main ED extensions
	Ask for senior Dr or senior Nurse	
MAU	Ext 6245/6377	

The first time a result meets the criteria for the values stated above, the SBAR procedure must be completed. Any subsequent results which are the same or show further deterioration must be phoned to the ward. If you are unsure, or concerned, please contact Consultant Chemical Pathologist or Clinical Scientist. If there is no response from on call consultant, an incident report must be filed on Datix web.

Appendix ii: Referral Laboratories

A number of specialist tests are referred to other Laboratories. These laboratories are subject to change. The laboratory does not accept responsibility for samples sent direct by users. Samples must be sent to the laboratory for booking in and onward referral for quality and audit purposes. This list is not definitive but currently includes:

Test	Bottle Type	Reference Laboratory	Sample Handling
Peripheral Blood			
11-Deoxycortisol	Gold	Synnovis (GSTS)	
1,25 D-Vitamin D	Gold	Synnovis (GSTS)	Consultant request only
17-Hydroxyprogesterone	Gold	Synnovis (GSTS)	
3-methoxytyramine (plasma metanephrines)	Purple	East Kent University Hospitals NHS Trust	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice
ACE (Angiotensin Converting Enzyme)	Gold	East Kent University Hospitals NHS Trust	
Active B12	Gold	Synnovis (GSTS)	
ACTH	Purple	Synnovis (KCH)	Must be received within 30 minutes of collection, send on ice.
Acylcarnitine/ Blood Spot Acylcarnitine	Green/Blood Spot	Sheffield	
Aldosterone:Renin	Green (DVH) Purple (Medway)	Imperial College (DVH) Synnovis (MMH)	Must be received within 30 minutes of collection, send on ice.
Adalimumab	Gold	Synnovis (GSTS)	Consultant request only
Alpha Subunit of TSH	Gold	Synnovis (GSTS)	
ALP Isoenzymes	Green or Gold	East Kent University Hospitals NHS Trust	
Alpha1-Antitrypsin	Gold	East Kent Hospitals	
Alpha1 –Antitrypsin Phenotype	Gold	East Kent Hospitals	
Aluminium	Gold	Synnovis (KCH)	
Amino Acids (Plasma)	Green	Synnovis (GSTS)	Lipaemic samples unsuitable! Must be in the Laboratory within 1 Hour of collection

Test	Bottle Type	Reference Laboratory	Sample Handling
Amiodarone	Gold	Synnovis (GSTS)	
Amyloid A	Gold	Synnovis (GSTS)	
Amylase Isoenzymes	Gold	Synnovis (KCH)	
Amitryptiline	Purple	Cardiff Toxicology	
Androstenedione	Gold	Synnovis (KCH)	
Apolipoprotein A1	Gold/Green	Synnovis (GSTS)	
Apolipoprotein E genotype	Purple	Synnovis (GSTS)	Available from Monday to Thursday
Aripiprazole	Purple	Synnovis (KCH)	Available from Monday to Thursday
Beta Carotene	Gold	St.Helier Hospital	Must be in the Laboratory within 30min of collection
Beta Hydroxybutyate	Gold	Synnovis (GSTS)	Must be in the Laboratory within 30min of collection
Biotinidase	Green	Synnovis (GSTS)	Available from Monday to Thursday
C1 Esterase Functional Assay	Gold	Synnovis (GSTS)	Must be in the Laboratory within 30min of collection
C1 Esterase Inhibitor	Gold	Synnovis (GSTS)	Available from Monday to Thursday
Cadmium	Purple	Synnovis (KCH)	Available from Monday to Thursday
Caeruloplasmin/Copper	Gold	East Kent Hospitals	
Calcitonin	Gold	Synnovis (KCH)	Must be in the Laboratory within 30min of collection
Carbohydrate Deficient Transferrin (CDT)	Gold	Synnovis (GSTS)	
CART	Purple	Charing Cross Hospital	Must be in the Laboratory within 30min of collection. Sample to be taken on ice
Cholinesterase	Gold	Synnovis (GSTS)	
Red Blood Cell (RBC) Cholinesterase	Purple	Cardiff Toxicology	Available from Monday to Thursday
Chromium	Purple	Synnovis (KCH)	
Chromogranin A	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice
Chromogranin B	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice

Test	Bottle Type	Reference Laboratory	Sample Handling
Clozapine	Purple	Synnovis (KCH)	Available from Monday to Thursday
Cobalt	Purple	Synnovis (KCH)	
Cystic Fibrosis Genetic Testing	Purple	Synnovis (KCH)	Available from Monday to Thursday
Cyclosporin	Purple	Synnovis (KCH)	
Cryoglobulins	Pink + White	St. Georges Hospital	Samples must be taken on a Monday or Tuesday morning between 9am and 10am. The laboratory must be contacted 1 week prior to the patient being bled
Dehydroepiandrosterone Sulphate (DHEAS)	Gold	Synnovis (KCH)	
Desethylamiodarone	Gold	St Helier Hospital	Send trough sample.
Dihydropyrimidine dehydrogenase (DPyD Mutations)	Purple + Spot Urine	Synnovis (GSTS)	Spot Urine not required for over 16's. Available from Monday to Thursday. Consultant request only. Sample must be refrigerated.
Dihydrotestosterone	Gold	Synnovis (GSTS)	
Ethosuximide	Gold	Epilepsy Society	
Flecainide	Gold	St George's Hospital	
Fluoride number	Gold	Synnovis (KCH)	
Free Light Chains (Serum)	Gold	Synnovis (GSTS) (Dartford) Birmingham (Medway)	
Fructosamine	Gold	Synnovis (GSTS)	
Gabapentin	Gold	Epilepsy Society	
Galactose-1-Phosphate Uridyl Transferase (GAL-1 PUT) (For confirmation)	Green	Synnovis (GSTS)	Available from Monday to Thursday
Galactose-1-Phosphate Uridyl Transferase (GAL-1 PUT) (Screening Test)	Blood Spot	Synnovis (GSTS)	
α -Galactosidase	Green	Synnovis (GSTS)	Available from Monday to Thursday. Consultant request only

Test	Bottle Type	Reference Laboratory	Sample Handling
Gastrin	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be sent on ice
Glucagon	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be sent on ice
Glutathione Peroxidase	Purple or Green	Glasgow Royal Infirmary	Available from Monday to Thursday. Consultant request only
Growth Hormone	Gold	East Kent Hospitals	Must be in the Laboratory within 1 Hour of collection
Homocysteine	Purple	Brighton	
Hydroxycarbamazepine	Gold	Synnovis (GSTS)	
IgE/RAST	Gold	East Kent Hospitals (William Harvey)	Allergens must be included in request otherwise test cannot be processed
IgG Subclasses	Gold	Sheffield	
IGF-1	Gold	East Kent Hospitals	
IGF BP3	Gold	Synnovis (KCH)	
Infliximab Level + Antibodies	Gold	Synnovis (GSTS)	Consultant request only
Inhibin A & B	Gold	Sheffield	
Insulin/C-Peptide	Gold	Synnovis (GSTS)	Must be in the Laboratory within 30 minutes of collection
Interleukin 6	Gold	PRU Sheffield	Must be in the Laboratory within 1 Hour of collection
Lacosamide	Gold	Epilepsy Society	
Lamotrigine	Gold	Synnovis (KCH)	
Lead	Purple	Synnovis (KCH)	Available from Monday to Thursday
Levetiracetam	Gold	Epilepsy Society	
Lipase	Gold	Synnovis (KCH)	
Lipoprotein (A)	Gold/Green	Synnovis (GSTS)	Consultant request only
Macroamylase	Gold	Southend University Hospital	

Test	Bottle Type	Reference Laboratory	Sample Handling
Macroprolactin	Gold	Synnovis	
Manganese	Dark Blue	Synnovis (KCH)	
MCAD	Blood Spot	Synnovis (GSTS)	
Mercury	Purple	Synnovis (KCH)	Available from Monday to Thursday
Metanephrine / Normetanephrine	Purple	East Kent University Hospitals	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice
Methotrexate	Gold	Synnovis (GSTS)	
Methymalonic Acid	Purple	Synnovis (GSTS)	
Mycophenolic Acid	Purple	Synnovis (KCH)	
Neurone Specific Enolase	Gold	Sheffield	
Non-esterified Fatty Acids or Free Fatty Acids	Gold	Synnovis (GSTS)	Must be in the Laboratory within 1 Hour of collection.
Olanzapine	Purple	Synnovis (KCH)	
Phenobarbitone	Gold	Synnovis (KCH)	
P1NP (Procollagen extension peptide)	Gold	Synnovis (GSTS)	
Pancreatic Polypeptide	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice!
Placental Alkaline Phosphatase	Gold	Sheffield	
Plasma Porphyrins	Purple	Synnovis (KCH)	Protect from light!
PRA (Ambulant/Recumbent)	Green (DVH) Purple (Medway)	Charing Cross Hospital	Must be in the Laboratory within 1 Hour of collection.
Pregabalin	Gold	Epilepsy Society	
Procollagen III N-Peptide (PIIINP)	Gold	Synnovis (KCH)	
Proinsulin	Gold	Guildford	Available from Monday to Thursday. Must be in the Laboratory within 1 Hour of collection.
Renal Stone Analysis	White Top Universal	UCLH	
Risperidone	Purple	Synnovis (KCH)	Available from Monday to Thursday.
Selenium	Dark Blue	Synnovis (KCH)	
Silver (Blood)	Purple	Guildford Trace Elements	Available from Monday to Thursday.

Test	Bottle Type	Reference Laboratory	Sample Handling
Sirolimus	Purple	Synnovis (KCH)	Include last dose and date/time of last dose on form. Available from Monday to Thursday.
Somatostatin	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice
Suphonylurea	Gold	Guildford	Consultant request only
Tacrolimus	Purple	Synnovis (KCH)	Include last dose and date/time of last dose on form. Available from Monday to Thursday.
Thyroglobulin/Anti Thyroglobulin	Gold	East Kent University Hospitals NHS Trust	Separate serum within 8hrs
Thyroid Hormone Assay Interference (Referred TFT)	Gold	Addenbrooke's Hospital	
Thyroid Receptor Antibodies/Anti – TSH Receptor Antibodies	Gold	Sheffield Teaching Hospitals	
Tin	Green	Southampton	
Thioguanine nucleotide (6TGN)	Purple	Synnovis (GSTS)	Available from Monday to Thursday. Consultant request only
Topiramate	Gold	Epilepsy Society	
TPMT	Purple	Synnovis (GSTS)	Available from Monday to Thursday
Transferrin Glycoforms	Gold	UCLH	Consultant request only
Tryptase	Gold	Synnovis (KCH)	Time of samples must be noted and time of onset
Very Long Chain Fatty Acids	Purple	Synnovis (GSTS)	Haemolysed Samples Not Suitable. Must be in the Laboratory within 30 minutes of collection
Vigabatrin	Gold	Epilepsy Society	
Vasoactive Intestinal Polypeptide (VIP)	Purple	Charing Cross Hospital	Must be in the Laboratory within 30 minutes of collection. Sample to be taken on ice

Test	Bottle Type	Reference Laboratory	Sample Handling
Vitamin A	Green	Synnovis (GSTS)	Protected from Light. Must be in the Laboratory within 30 minutes of collection
Vitamin B1 (Thiamine)	Purple	Synnovis (GSTS)	Protected from Light. Must be in the Laboratory within 30 minutes of collection
Vitamin B2	Purple	Synnovis (GSTS)	Must be in the Laboratory within 30 minutes of collection
Vitamin B6	Purple	Synnovis (GSTS)	Protected from Light. Must be in the Laboratory within 30 minutes of collection
Vitamin E	Green	Synnovis (GSTS)	Protected from Light. Must be in the Laboratory within 30 minutes of collection
White Cell Enzymes	Green	Synnovis (GSTS)	Available from Monday to Thursday. Consultant request only
Zinc	Dark Blue	Synnovis (KCH)	
Zonisamide	Gold	Epilepsy Society	
Urine Tests			
Amino Acid Chromatography / Cystine	White Top Universal / 24 Hour Urine Collection	Synnovis (GSTS)	Acidified samples are unsuitable
Arsenic	White Top Universal/Acid-washed 24 Hour Collection	Synnovis (KCH)	
Urine C Peptide	Red top Boric Acid	Exeter	
Citrate/ Oxalate	24 Hour Collection in acidified bottle	East Kent University Hospitals NHS Trust	
Copper	24 Hour Collection in acid-washed bottle	Synnovis (KCH)	

Test	Bottle Type	Reference Laboratory	Sample Handling
Free Cortisol	24 Hour Collection	East Kent University Hospitals NHS Trust	
Drug Screen	White Top Universal	Synnovis (KCH)	
GAG:Creatinine Ratio	White Top Universal	Synnovis (GSTS)	
Hydroxyproline	24 Hour Collection in acidified bottle	Synnovis (KCH)	
Ref Urine Iron	White Top Universal/Acid Washed 24 Hour Collection	Synnovis (KCH)	
Ref Urine Mercury	White Top Universal/Acid Washed 24 Hour Collection	Synnovis (KCH)	
Metadrenaline / Normetadrenaline	24 Hour Collection in Acidified Bottle	St Helier Hospital	
Mucopolysaccharides (MPS)	White Top Universal	Synnovis (GSTS)	
N-Terminal Telopeptide Collagen I Cross-Links (NTX)	White Top Universal	Synnovis (KCH)	
Organic Acids	White Top Universal	Synnovis (GSTS)	
Porphyryns (Quantitative)	24 Hour Collection darkened bottle	Synnovis (KCH)	Protect from light
Porphyryns (Urine for fractionation)	White Top Universal	Synnovis (KCH)	Protect from light
Retinol Binding Protein	White Top Universal	Great Ormond Street	Consultant request only
Silver (Urine)	White Top Universal	Guildford Trace Elements	
Steroid Profile	24 Hour Collection/ White Top Universal	Synnovis (KCH)	
Trimethylamine	White Top Universal	Sheffield Teaching Hospitals	
Urine Sugar Chromatography	White Top Universal	Synnovis (KCH)	

VMA (Children under 16)	White Top Universal - Acidify with 2 drops of 5M HCL	St Helier Hospital	Must be received in lab on same day.
CSF Tests	CSF Tests	CSF Tests	CSF Tests
CSF S100 Beta	White Top Universal	UCLH Neuroimmunology & CSF Lab	Must be in the Laboratory within 30 minutes of collection. Consultant request only
Angiotensin Converting Enzyme (ACE) CSF	White Top Universal	Ground Floor, Medical Oncology Block Charing Cross Hospital	Consultant request only
Oligoclonal bands	CSF (White Top Universal) + Serum (Gold)	Synnovis (KCH)	Consultant request only
Protein 14-3-3	White Top Universal	UCLH Neuroimmunology & CSF Lab	Must be in the Laboratory within 30 minutes of collection. Consultant request only
Tau protein (β -2 transferrin)	White Top Universal	Sheffield Teaching Hospitals	
CSF Dementia Screening (CSF Total Tau, CSF Amyloid Beta 1-42 and CSF Tau/A Beta Ratio)	White Top Universal	UCLH Neuroimmunology & CSF Lab	Must be in the Laboratory within 30 minutes of collection. Consultant request only
Stool Tests			
Elastase (Stool)	Blue Faeces Pot	Synnovis (KCH)	
Porphyrins (Faeces)	Darkened White Top	Synnovis (KCH)	Protect from light
Faecal Calprotectin	Blue Faeces Stool pot	Maidstone (MTW)	
qFIT (Quantitative faecal immunotest)	Specific qFIT sample pot.	Maidstone (MTW)	

Appendix iii: Factors affecting sample quality and interpretation of results

Causes of misleading results relating to sample collection
<ul style="list-style-type: none">○ Physical activity (including fast walking) within 20 minutes○ Smoking○ Stress○ Dehydration○ Drugs or dietary supplement administration within 8 hours○ Time (diurnal variance)○ Posture (lying, standing or sitting)○ Haemoconcentration from prolonged tourniquet pressure○ Excessive negative pressure when using syringe○ Incorrect tube type○ Capillary or venous blood○ Insufficient or excess anticoagulant○ Inadequate mixing of sample○ Inadequate sample storage conditions (temperature)○ Delay in transit to the laboratory
Factors which may affect laboratory results
<ul style="list-style-type: none">○ Sample quality (under filled, over filled, clotted including fibrin clots)○ Labile properties of assayed components○ Interference (lipaemia, icterus, haemolysis)○ Centrifugation○ Interactions with anticoagulants (eg platelet clumping in EDTA)○ Pregnancy
It may be necessary under certain circumstances for the laboratory to request a repeat sample for confirmation of abnormal or equivocal results

Appendix iv: Test Information Documents

Where to collect the 24-hour urine container?

PLAIN container – can be collected from a GP surgery. Please contact your GP surgery to pre-order the container from Pathology Department (see opening times below).

ACID container – for some investigations, an acid preservative (5M HCl) is added to the 5L 24-hour collection container. Such a container **must be** collected from Pathology Department:

Darent Valley Hospital:

Pathology Department is in East Wing on Level 3, junction 2.
Opening times are 0830 – 1700 hours, Monday to Friday.
Phone: 44 (0)1322 428 100; ext. 4885.

Medway Maritime Hospital:

Pathology Department is located in the Red Zone, on Level 4.
Opening times are 0800 – 1730 hours, Monday to Friday.
Phone: 44 (0)1634 815 158

Safety precautions for acidified containers:

1. **Acid containers** come with the following information:

Warning
This container contains 5M Hydrochloric Acid preservative
On skin contact wash off immediately with water
Keep away from children

2. **Ensure that the cap is firmly screwed onto the container before transporting it.**
3. **Please be very careful to keep the bottle upright to prevent spillage and avoid any contact with the contents as the acid may cause severe burns.**
4. **On skin contact wash off immediately with copious amounts of water and if there are any symptoms, medical attention should be sought.**
5. **Do not empty out or wash the container.**
6. **Keep the bottle out of reach of children and animals.**

Instructions to patients for the collection of a 24-hour urine specimen:

1. Check the leaflet below and the request form for any dietary and/or drug restrictions (depending on the test requested). You should drink as much fluid as you normally would over the course of the collection.
2. Plan your 24-hour collection on a day off if you are not able or comfortable doing it at work/school.
Please remember, if you go out, do take your collection bottle with you!
3. It is advisable not to commence the collection on a Friday or Saturday, as the Pathology Laboratory will not be open for you to bring the container back when you have finished the collection.
4. Do not urinate directly into the container. Use a clean container (such as a jug) or disposable cup to transfer the urine to the bottle (follow the safety precautions).

5. If, for any reason, you miss, or spill part of the collection, you will have to repeat the whole collection. Drop the used container into the laboratory (for safe disposal) and collect a fresh container.
6. If you have a bowel movement, you must collect the urine separately. If unable to do so you should abandon the collection and start again on another day, using a fresh container.
7. Females should avoid collection during a menstrual period.
8. On the day you decide to start the collection, empty your bladder but **do not** collect this urine. You will now have an empty bladder and an empty bottle. The collection of urine will start from that time. **Please note both the date and time on the collection bottle label, where it says 'start date and time'**. Ensure to write your full name and date of birth on the container label too.
9. You should aim to collect into the container every drop of urine you pass during the day and night within the next 24-hour period.
10. It does not matter what the urine volume is, as long as it represents every drop you pass.
11. Between each time you pass urine, keep the sample container closed and stored away from direct heat (such as heaters or radiators) and sunlight but there is no need to cool it.
12. End the collection exactly 24 hours after the start time by emptying your bladder and adding this final specimen to the container. The time you pass the last urine specimen should not vary by more than five or ten minutes from the time of starting the collection the previous day. The collection is now complete. **Please note both the finish date and time on the bottle label.**
13. Return the container as soon as conveniently possible together with the request form to the Pathology Department.

**Ensure that the cap is firmly screwed onto the container
before transporting it.**

Instruction to patients for the collection of a 24-hour urine specimen for

5-HIAA:

Safety precautions for acidified containers: for the 5HIAA investigation, an acid preservative (5M HCl) is added to the 5L 24-hour collection bottle.

Acid containers come with the following information

Warning

This container contains 5M Hydrochloric Acid preservative
On skin contact wash off immediately with water
Keep away from children

1. Ensure that the cap is firmly screwed onto the container before transporting it.
2. Please be very careful to keep the bottle upright to prevent spillage and avoid any contact with the contents as the acid may cause severe burns.
3. On skin contact wash off immediately with copious amounts of water and if there are any symptoms, medical attention should be sought.
4. Do not empty out or wash the container.
5. Keep the bottle out of reach of children and animals.

Where to collect the 24-hour urine container?

Darent Valley Hospital:

Pathology Department is in East Wing on Level 3, junction 2.
Opening times are 0830 – 1700 hours, Monday to Friday.
Phone: 44 (0)1322 428 100; ext. 4885.

Medway Maritime Hospital:

Pathology Department is located in the Red Zone, on Level 4.
Opening times are 0800 – 1730 hours, Monday to Friday.
Phone: 44 (0)1634 815 158

Precautions before urine collection:

1. The following foods contain serotonin, the precursor of 5-HIAA, which can cause falsely elevated test results and should be avoided for three days prior to and during the urine collection:
 - Aubergines
 - Avocados
 - Bananas
 - Kiwi fruit
 - Pineapples
 - Plums
 - Tomatoes
 - Walnuts
 - Health food supplements containing 5-hydroxytryptophan

2. Your doctor may ask you to discontinue some medication as some drugs can **increase 5HIAA** measurements e.g.:
 - Cough syrup
 - Reserpine
3. Your doctor may ask you to discontinue some medication as some drugs can **decrease 5HIAA** measurements:
 - Alcohol
 - L-dopa
 - MAO inhibitors (e.g. Imipramine)
 - Heparin
 - Methyl dopa
 - Phenothiazines
 - Tricyclic antidepressants
 - Isonicotinic acid hydrazide

PATIENTS SHOULD TALK TO THEIR DOCTOR BEFORE REDUCING / DISCONTINUING ANY MEDICATIONS.

Instructions for the collection of a 24-hour urine specimen:

1. Check the leaflet below and the request form for any dietary and/or drug restrictions (depending on the test requested). You should drink as much fluid as you normally would over the course of the collection.
2. Plan your 24-hour collection on a day off if you are not able or comfortable doing it at work/school.
Please remember, if you go out, do take your collection bottle with you!
3. It is advisable not to commence the collection on a Friday or Saturday, as the Pathology Laboratory will not be open for you to bring the container back when you have finished the collection.
4. Do not urinate directly into the container. Use a clean container (such as a jug) or disposable cup to transfer the urine to the bottle (follow the safety precautions).
5. If, for any reason, you miss, or spill part of the collection, you will have to repeat the whole collection. Drop the used container into the laboratory (for safe disposal) and collect a fresh container.
6. If you have a bowel movement, you must collect the urine separately. If unable to do so you should abandon the collection and start again on another day, using a fresh container.
7. Females should avoid collection during a menstrual period.
8. On the day you decide to start the collection, empty your bladder but **do not** collect this urine. You will now have an empty bladder and an empty bottle. The collection of urine will start from that time. **Please note both the date and time on the collection bottle label, where it says 'start date and time'**. Ensure to write your full name and date of birth on the container label too.
9. You should aim to collect into the container every drop of urine you pass during the day and night within the next 24-hour period.
10. It does not matter what the urine volume is, as long as it represents every drop you pass.
11. Between each time you pass urine, keep the sample container closed and stored away from direct heat (such as heaters or radiators) and sunlight but there is no need to cool it.
12. End the collection exactly 24 hours after the start time by emptying your bladder and adding this final specimen to the container. The time you pass the last urine specimen should not vary by more than five or ten minutes from the time of starting the collection the previous day. The

collection is now complete. **Please note both the finish date and time on the bottle label.**

13. Return the container as soon as conveniently possible together with the request form to the Pathology Department.

Ensure that the cap is firmly screwed onto the container before transporting it.

Instruction to patients for the collection of a 24-hour urine specimen for Metadrenalines, Catecholamines and VMA:

Safety precautions for acidified containers: for Metadrenalines, Catecholamines and VMA investigation, an acid preservative (5M HCl) is added to the 5L 24-hour collection bottle. **Acid containers** come with the following information

Warning

This container contains 5M Hydrochloric Acid preservative
On skin contact wash off immediately with water

Keep away from children

1. Ensure that the cap is firmly screwed onto the container before transporting it.
2. Please be very careful to keep the bottle upright to prevent spillage and avoid any contact with the contents as the acid may cause severe burns.
3. On skin contact wash off immediately with copious amounts of water and if there are any symptoms, medical attention should be sought.
4. Do not empty out or wash the container.
5. Keep the bottle out of reach of children and animals.

Where to collect the 24-hour urine container?

Darent Valley Hospital:

Pathology Department is in East Wing on Level 3, junction 2.
Opening times are 0830 – 1700 hours, Monday to Friday.
Phone: 44 (0)1322 428 100; ext. 4885.

Medway Maritime Hospital:

Pathology Department is located in the Red Zone, on Level 4.
Opening times are 0800 – 1730 hours, Monday to Friday.
Phone: 44 (0)1634 815 158

Precautions before urine collection:

1. Avoid the following foods for three days before the test and whilst collecting the sample:
 - Caffeine (moderate amounts of tea and coffee are fine)
 - Fruit (particularly bananas, Citrus fruit)
 - Vanilla (including confectionary that contains vanilla)
 - Chocolate, Cocoa
2. Your doctor may ask you to discontinue some medication as some drugs **increase** urine catecholamine measurements e.g. *alpha-blockers, aminophylline, amphetamine, benzodiazepines, buspirone, beta-blockers, caffeine, catecholamines e.g. decongestants, chlorpromazine, diazoxide, domperidone, ethanol, glyceryltrinitrate, hydralazine, levodopa, labetalol, lithium, metachlopramide, methyl dopa, nicotinic acid / nicotine (in large doses), nitroglycerin, sodium nitroprusside, sotolol, theophylline, tricyclic antidepressants.*
3. Your doctor may ask you to discontinue some medication as some drugs **decrease** urine catecholamine measurements e.g. *clonidine, disulfiram, guanethidine and other adrenergic*

blockers, imipramine, MAO inhibitors, methylglucamine, methyltyosine, phenothiazines, reserpine, salicylates.

4. Some medications have variable effects on urine catecholamine measurements e.g. *levodopa, tricyclic antidepressants, calcium channel blockers, ACE inhibitors, bromocriptine.*

**PATIENTS SHOULD TALK TO THEIR DOCTOR
BEFORE REDUCING / DISCONTINUING ANY MEDICATIONS.**

5. **Activities to avoid:** vigorous or prolonged exercise prior to urine collection can result in an increase in the output of catecholamines by as much as sevenfold.

Instructions for the collection of a 24-hour urine specimen:

1. Check the leaflet below and the request form for any dietary and/or drug restrictions (depending on the test requested). You should drink as much fluid as you normally would over the course of the collection.
2. Plan your 24-hour collection on a day off if you are not able or comfortable doing it at work/school. Please remember, if you go out, do take your collection bottle with you!
3. It is advisable not to commence the collection on a Friday or Saturday, as the Pathology Laboratory will not be open for you to bring the container back when you have finished the collection.
4. Do not urinate directly into the container. Use a clean container (such as a jug) or disposable cup to transfer the urine to the bottle (follow the safety precautions).
5. If, for any reason, you miss, or spill part of the collection, you will have to repeat the whole collection. Drop the used container into the laboratory (for safe disposal) and collect a fresh container.
6. If you have a bowel movement, you must collect the urine separately. If unable to do so you should abandon the collection and start again on another day, using a fresh container.
7. Females should avoid collection during a menstrual period.
8. On the day you decide to start the collection, empty your bladder but **do not** collect this urine. You will now have an empty bladder and an empty bottle. The collection of urine will start from that time. **Please note both the date and time on the collection bottle label, where it says 'start date and time'.** Ensure to write your full name and date of birth on the container label too.
9. You should aim to collect into the container every drop of urine you pass during the day and night within the next 24-hour period.
10. It does not matter what the urine volume is, as long as it represents every drop you pass.
11. Between each time you pass urine, keep the sample container closed and stored away from direct heat (such as heaters or radiators) and sunlight but there is no need to cool it.
12. End the collection exactly 24 hours after the start time by emptying your bladder and adding this final specimen to the container. The time you pass the last urine specimen should not vary by more than five or ten minutes from the time of starting the collection the previous day. The collection is now complete. **Please note both the finish date and time on the bottle label.**
13. Return the container as soon as conveniently possible together with the request form to the Pathology Department.

**Ensure that the cap is firmly screwed onto the container
before transporting it.**

Instructions for using urine vacutainer tubes



VACUETTE® urine beaker with integrated transfer device (product code 724310)

Patient's Instructions for Use



Open the lid of the urine beaker by turning in an anti-clockwise direction. **DO NOT REMOVE THE SAFETY LABEL ON TOP OF BEAKER.**



Fill the beaker with between 20ml and 90ml of mid-stream urine. Firmly close the lid by turning in a clockwise direction to prevent leakage.



DO NOT UNSCREW THE LID OF THE BEAKER. Carefully peel back the safety label on top of beaker to reveal the integrated transfer device.



Insert the **VACUETTE®** tube into the transfer device of the beaker with the safety cap down. Ensure that the needle penetrates the stopper of the tube and hold in place.



Urine will flow automatically in accordance with the pre-defined vacuum within the tube. Hold tube in place with the thumb until the urine stops flowing into the tube.



The specimen must be labelled immediately with: **Full name, date of birth and date of collection** then returned to the surgery as soon as possible.

Instructions for collection of stool samples

Only use the container provided.


- Label the container with your full name, date of birth and the date
- Place something in/over the toilet to catch the stool such as a potty, empty clean plastic container or plastic wrap over the rim of the toilet.
- Try not to collect urine or water from the toilet along with the stool samples. Please urinate prior to collecting the stool.
- Make sure the stool doesn't touch the inside of the toilet.
- Using the spoon/spatula that comes with the container transfer some of the stool to the container. It should not be full, aim to fill a third of the container (approximately the size of walnut)
- Screw the lid shut.
- Put anything used to collect the stool in a plastic bag, tie it up and put in the bin.
- Wash your hands thoroughly with soap and running water.
- The sample should be handed in as soon as possible



















Appendix V – Greiner tube information


VACUETTE® SELECTION CHART

Dartford and Gravesham NHS Trust











**Blood cultures must be taken first - Use winged blood collection system.
Fill aerobic bottle first and then anaerobic bottle. Invert bottles to thoroughly mix specimen**


Item Number	Cap Colour	Volume	Cap Ring Colour	Tube Contents	Tests	Special Instructions
1	 Blue	3ml	 Black	Trisodium Citrate	Haematology: Anti-thrombin III, Anti Xa level, APTT, Coagulation screen, D Dimers, Factor VIII, Protein C, Protein S, Prothrombin Time / INR, Lupus A/C, Clotting Factor Assays, I/WD Screen (5 Tubes)	For clotting assays, one sample is required for each assay requested.
2	 Gold	5ml	 Gold	Clotting Accelerator and Separation Gel	Biochemistry: Group 1: Renal, Liver & bone profiles, Lipids, CRP, LDH, Paracetamol, Salicylate, Alcohol, GGT, CK, Iron, Theophylline, Bicarbonate, Uric acid, Bile acid, Lithium Group 2: Thyroid profile, Fertility tests, Ca19-9, Ca 125, CEA, AFP, Haematinics, Troponin, Digoxin, Antibiotic assays, Phenobarbitone, Phenytoin, Carbamazepine, Cortisol, PSA, HCG Group 3: Protein electrophoresis, C3, C4, Immunoglobulins, Osmolality, ACE, TPO, SHBG, HGH, Ca 15-3 Haematology: Anti-cardiolipin antibodies, B2 Microglobulin, B12 & Folate, Erythropoietin level, Ferritin, Serology: Ante-natal screening, HIV, Hepatitis [A, B, and C], CMV, Toxoplasma, Varicella	Each group requires a separate sample
3	 Green	4ml	 Yellow	Li Heparin and Separation Gel	Biochemistry: Aldosterone, Homocysteine, Mercury, Renin, Ammonia Serology: IGRA (2 tubes)	
4	 Navy Blue	6ml	 Black	Sodium Heparin	Biochemistry: Trace elements	
5	 Lavender	4ml	 Black	EDTA	Haematology: BCR- <i>abl</i> , Blood film, CD4/CD8 count, Cell Markers (10ml), Cyclosporin, ESR, Factor V Leiden, FK 506, Fragile X, Full blood count, Haemoglobinopathy screen, HLA B27, Malarial parasites / screen, Paul Bunnell / Monospot, Prothrombin Gene Mutation, Red Cell Folate, Sickle test, Viscosity, MTHFR, JAK2 (2 tubes) Serology: HIV Viral Load (3 tubes)	<i>BCR-<i>abl</i></i> - four sample tubes are required, <i>Paul Bunnell / Monospot</i> - must have FBC, one sample for both
6	 Lavender	2ml	 White	EDTA	Biochemistry: Hba1C, Carboxyhaemoglobin, Lead	
7	 Pink	6ml	 Black	EDTA for Crossmatch	Transfusion: Blood Group & antibody screen Biochemistry: BNP testing	For all enquiries about Transfusion requests please phone Ex 8501
8	 Grey	2ml	 Black	NaF/EDTA	Biochemistry: Glucose (GTT), Lactate	

 **IMPORTANT:** Hold tube in place with the thumb until filled to the required level

Other information if required: Haematology – Phone 8506 if test not listed or if there is uncertainty ONE sample only sufficient – unless specified.

 Multi Sampling Needle 21Gx1.5 450076 KFK 228 22Gx1.5 450075 KFK 230	 VISO PLUS 'Railback' Needle 21Gx1.5 450040 KFK 023 22Gx1.5 450041 KFK 017	 Tube Holder 450209 KFK 322	 QUICKSHIELD 450230 KFK 287	 Safety Blood Collection Set: with Luer Adapter and Holder KFK137 KFK138	 Holdex 450251 KFK 111	 Blood Transfer Unit 450225 KFK373	 Blood Culture Safety Blood Collection Sets KFK 416 KFK 417
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VADM VERSION 2.
Last updated
12.05.2015



VACUETTE® SELECTION CHART



Invert samples 5 - 8 times

Item Number	Volume	Cap Colour	Tube Contents	Tests	Special Instructions
Samples should be taken in the following order					
1	10ml		Blood Culture	Aerobic followed by anaerobic > If insufficient blood for both culture bottles, use aerobic bottle only. Draw volumes: 10ml per bottle Please refer to Blood Culture Collection Policy	
2	454334 3ml 454322 2ml	 Blue	Trisodium Citrate	<ul style="list-style-type: none"> Clotting Screen INR APTT D-Dimers Thrombophilia Screen (4 tubes) 	Tubes MUST be filled within the arrow on the label. Under or overfilled samples cannot be tested.
3	456089 6ml 454236 2ml	 Red	Clotting Accelerator (no gel)	<ul style="list-style-type: none"> Microbiology Antibiotic Assays Immunology Viral Serology Progesterone Glandular Fever 	
4	456018 5ml 454228 4ml	 Gold	Clotting Accelerator and Separation Gel	<ul style="list-style-type: none"> All Biochemistry tests. All Immunology tests. 	Collection date and time is required for all samples.
5	456084 6ml 454089 2ml	 Green	Li Heparin	<ul style="list-style-type: none"> Special Biochemistry Tests TB Spot test 	Refer to Intranet site or telephone laboratory for details.
6	454209 4ml 454222 2ml	 Lavender	EDTA	<ul style="list-style-type: none"> FBC ESR HbA1c Malaria G6PD Sickle screen Cyclosporin PCR Viral Load CD4 Kleihauer 	Please fill to 4ml line if require FBC and ESR. A separate tube is required for HbA1c or Cyclosporin.
7	456252 6ml	 Pink	EDTA for Crossmatch	<ul style="list-style-type: none"> Group & Save / Crossmatch / Antibody Screen Cord Blood Direct Antiglobulin Test HLA-B27 BNP (Biochem) 	Label MUST be handwritten, with First & Last Name, DOB & Full Record No. If no Hospital No. include 1st line of address & postcode. All samples must be signed & dated by the collector.
8	454238 2ml	 Grey	NaF/EDTA	<ul style="list-style-type: none"> Glucose Alcohol Lactate Ethylene Glycol 	Contact Biochemistry before taking alcohol or lactate sample.
		IMPORTANT: Hold tube in place with the thumb until filled to the required level			
For further copies of this guide and questions regarding specific tests, please contact the main Pathology Laboratory.					
VACUETTE® products and ordering codes					
 VISIO PLUS 'Flashback' Needles 21Gx1.5 450040 KFK 023 22Gx1.5 450041 KFK 017	 QUICKSHIELD 450230 KFK 287	 Safety Blood Collection Sets: Available with preattached Holder: 21G needle 450085, KFK137 23G needle 450086 KFK138	 Holdax 450261 KFK 111	 Blood Transfer Unit 450225 KFK373	 Blood Culture Safety Blood Collection Sets 21G needle 450182 KFK 416 23G needle 450183 KFK 417
www.gbo.com/preanalytics VAMM02 VERSION 3. Last updated July 2013					