

Northumbria Healthcare   
NHS Foundation Trust

## Department of Clinical Chemistry

Clinical Chemistry LABORATORY  
HANDBOOK

**This SOP supersedes all previous versions**

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Next Review date : November 2013

# Clinical Chemistry Department

## Overview

The Clinical Chemistry Department is part of the Pathology Service at Northumbria Healthcare NHS Foundation Trust.

Analytical Laboratory services are provided at three Trust locations; Hexham, North Tyneside and Wansbeck Hospitals.

The department also refers specialised tests by arrangement to relevant reference centres.

Our aim is to provide an accessible and comprehensive diagnostic support service to both hospital and primary care clinicians.

All laboratories are fully accredited by CPA and are accredited for training Biomedical Scientists by the Institute of Biomedical Science (CPA registration number is 1161).

In addition to analytical services, the Department provides an electronic result reporting service to General Practices, in accordance with National Pathology Messaging Guidelines.

Dr Paul Mckenna, Dr Nigel Brown (Toxicology) and Daniel Turnock are available to provide advice on appropriate investigations and interpretation of results. Out of normal working hours they may be contacted via the hospital switchboard for advice over urgent matters.

The quality of the service is continuously monitored by internal quality control procedures and participation in National External Quality Assessment Schemes for the range of analytes provided. In addition the department regularly participates in clinical audit.

## Useful Telephone numbers

### Specimen reception:

Hexham	01434 655942	Internal ext 5942
Wansbeck	01670 5293743	Internal ext 3743
North Tyneside	0191 2932764	Internal ext 2764

### RESULT ENQUIRIES

Hexham	01434 655008	Internal ext 5008
Wansbeck	01670 5293711/13	Internal ext 3711/13
North Tyneside	0191 2932592/2373	Internal ext 2592 / 2373

GP Electronic Results Service  
Joanne Campbell

Ext 3721  
(Direct 01670 529721)

### SENIOR STAFF

#### **Consultant Chemical Pathologist / Head of Department**

Dr. Paul McKenna. MA, PhD, MB BS, CSci, MRCP (UK), FRCPath, EuroClinChem  
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#### **Consultant Biochemist**

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#### **Principal Biochemist (Toxicology)**

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#### **Clinical Scientist**

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**BMS 4, Clinical Chemistry Trust wide**

**Mr.David Dodds, BSc, MSc, FIBMS, CSci**

**Telephone HGH 01434 6555007 (Ext 5007)**

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**Point of Care Coordinator**

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Secretary to Consultants

**Jan Skipsey**

**Telephone Direct line 0191 293 2546**

## LABORATORY OPENING HOURS

### North Tyneside

Open for the receipt and handling of specimens from 08:00 am to 20:00, Monday to Friday and from 08:30 to 12:30 on Saturday. During these periods we assay most of the routinely available tests every day.

Out of hours i.e. between 20:00 and 08:00, Monday to Friday, 12:30 Saturday to 08:00 Monday and all day during Bank Holidays the Biochemistry laboratory is staffed by a single handed BMS primarily to provide a service for emergency and essential work.

### Wansbeck

The laboratory is open for receipt of samples between the hours of 08:15 and 20:00 Monday to Friday and 09:00 am to 13.00 on Saturday, Sunday.

During these times we will assay most of our routinely available tests.

Out of hours i.e. between 20:00 and 08:00, Monday to Friday, 12:30 Saturday to 08:00 Monday and all day during Bank Holidays the Biochemistry laboratory is staffed by a single handed BMS primarily to provide a service for emergency and essential work.

### Hexham

The laboratory is open for receipt of samples between the hours of 08:30 and 17:30 Monday to Friday. Outside these hours a multi-disciplinary service operates with one member of staff covering Biochemistry and Haematology, & Transfusion.

## REQUEST FORMS AND SPECIMEN CONTAINERS

Wherever possible we would ask that you give full clinical and drug therapy details – this helps us process your request accurately and efficiently as well as allowing us to add additional tests to facilitate patient management. The information helps us to deal with abnormal results which may need urgent transmission e.g. out-of-hours.

Full information is given on the specimen requirements for the common Biochemistry assays on the Vacutainer Tube Guide distributed to each ward and practice. The Sunquest ICE ordering system is in use with in Northumbria Trust. This system will provide information on specimen tubes required based on the tests requested, on the generated request form.

## Specimen Ordering on ICE/Electronic Requesting

### Guidance for Use

There are comprehensive manuals built into ICE, available to all users. Shorter guides and demonstrations are also available on the Trust Intranet training pages.

External link: [http://intranet/it\\_training/icedesktop.htm](http://intranet/it_training/icedesktop.htm)

### Contact Names for ICE

For pathology Trustwide: Garry Swinton. Tel: 01434 655011 (HGH Ext: 5011).

### REPORT TURNAROUND TIME

The majority of the commonly requested non-urgent tests will have results available within 4 hours. See individual test details for further information. We aim to turnaround the majority of urgent tests within 1 hours.

### ADD ON TESTS

Requests to add on additional tests to the original request should be made by phoning the laboratory, being ready to give patient name and date of birth, date sample taken, and lab number if available (either from the printed report or from the electronic reporting system).

Samples are stored for 5 to 7 days after analysis. The decision to perform add on tests will depend on the delay in receiving the request and the stability of the analyte concerned.

You will be advised if the sample is too old or unsuitable for the test you are requesting. If there is insufficient sample remaining for your additional request, this will be reported in the same way that a result would be (by paper report and electronically) – the person taking your call will not know at the time that there is insufficient sample.

### URGENT AND PLEASE PHONE RESULTS

URGENT requests MUST be accompanied by a telephoned request from the clinician indicating the degree of urgency and the form marked as Urgent, unless there are agreed alternative arrangements in place e.g. Red Pouches in A/E

**Assays available under the Urgent System are:****Blood**

Alcohol  
Ammonia  
Amylase  
Blood Gases and Carboxy Hb  
BHCG  
Calcium/Albumin  
Carbamazepine  
Creatine Kinase  
Digoxin  
Glucose  
Lactate  
Lithium  
Liver function tests  
Magnesium  
Osmolality  
Paracetamol  
Salicylate  
Theophylline  
Troponin T  
Urate  
U/E, Bicarbonate and Chloride

**CSF**

Glucose  
Protein  
Xanthochromia (Spectrophotometry)  
Lactate

**Urine**

Albumin/Creatinine ratio  
Osmolality  
Porphyrin screen  
Protein/Creatinine ratio (pregnancy)  
U/E

## Test profiles

- 1. U & E** A routine U&E consists of Na, K, Urea and Creatinine. Chloride and Bicarbonate are added to urgent requests or if specifically requested.
- 2. Liver Function Tests.** This routinely consists of Bilirubin, Alkaline Phosphatase, ALT, Total Protein, Albumin and calculated Globulins. AST and GGT are available on request. Conjugated bilirubin is available if specifically requested but will only be done if the total bilirubin is raised. An abnormal globulin level together with appropriate clinical details may in addition be subjected to a paraprotein screen if not previously done.
- 3. Thyroid Function Tests.** A cascade system is used where TSH is measured initially. If raised then Free Thyroxine (fT4) is also measured. If the TSH is low then fT4 and fT3 are also measured. If hypopituitarism is suspected than fT4 should be specifically requested. Please indicate on the request form if the patient is on thyroid replacement, on therapy for hyperthyroidism or has been treated for thyroid cancer.

**NHS GENERAL**

**Specimen Labelling Requirements**

To comply with Trust Policies and the Safer Practice Notice NPSA/2009/SPN002, the NHS number must be given on all correspondence etc.

All specimens **must** be labelled with;

**First Name and Surname**

**Date of birth**

**NHS or Trust number**

and should have

**Date and time of specimen**

**Location**

All request forms **must** give;

**NHS number**

**Full patient name**

**Trust Number (for hospital patients only)**

**Date of birth**

along with

**Location**

**Date and time of specimen**

**Requesting Doctor/Practitioner and Consultant/GP**

All appropriate **Clinical Information** relevant to tests requested

To assist with handling of abnormal results out of hours, all GP request forms should give the patient's address and a contact telephone number.

If the NHS number is not available, the reason should be written on the request form and specimens will be analysed as usual if otherwise compliant with above policy.

If the patient identification details need to be handwritten, then allowance will be made for the difficulties of writing the details on a specimen, but those on the request form must be clear and legible.

Otherwise, unlabelled or inadequately labelled specimens will **not** be processed except in exceptional circumstances after discussion with the appropriate Consultant Pathologist. All requests/specimens failing the above criteria will be subject to IR1 reporting.

If you require any further advice please contact either Dr Paul McKenna, Consultant Chemical Pathologist (0191 2932546 or ext 2376) or Mike Carr (0191 2934005) Laboratory Manager

**TELEPHONING OF RESULTS**

The results telephoned are shown in table 1.

The values used are based on guidance from the Royal College of Pathologists.

**Table 1** Northumbria Healthcare Clinical Chemistry  
Lab telephone criteria

Analyte	Lower limit	Upper limit	<u>Comments</u>
Sodium	<125	>155	* unless consistent with previously reported results
Potassium	<3.0	>5.5	
Urea		>30	* unless consistent with previously reported results
Creatinine		>200	* unless consistent with previously reported results
CO2	<12		
Amylase		>300	
Calcium	<1.8	>2.8	
Phosphate	<0.5		
Urate		>0.7	
Glucose	<3.0	>25	
Magnesium	<0.5	>2.0	
Carbamazepine		>15	
Digoxin		>2.5	
Theophylline		>25	
Phenytoin		>20	
Phenobarbitone		>50	
Lithium		≥1.0	
Troponin	>14 GPs only		
Paracetamol	All detected		
Salicylate	All detected		
CSF Xanthochromia	All		

Telephoned Results \*Somewhat wider limits are applied to some analytes for results of GP samples analysed outside surgery hours, where it will be necessary to contact the GP deputising service. Abnormal results will be telephoned to the GP surgery the next morning. (Refer to table 2)

Table 2 **Northumbria Healthcare Clinical Chemistry**  
Critical list for telephoning to GPs out of hours

Analyte	Lower limit	Upper Limit
Sodium	<120	>155*
Potassium	<2.5	>6.0
Urea		>30*
Creatinine		>300*
Calcium	<1.8	>3.5
Urate		>0.7
Glucose	<2.5	>25
Magnesium	<0.4	
Phosphate	<0.3	
Carbamazepine		>25
Digoxin		>3.0
Theophylline		>45
Phenytoin		>30
Lithium		≥1.0
Phenobarb		>70
AST or ALT		>1000
CK		>5000
Amylase		>300
Troponin T		>14

\* unless consistent with previously reported results

All results where paracetamol, salicylate or CSF xanthochromia are detected are also telephoned.

**Tumour Markers – indications for measurement**

Marker	Organ	General Screening	Diagnosis	Prognostic Indicator	Monitoring Treatment	Other causes of raised levels
<b>PSA</b>	Prostate	No	Supportive	Yes	Yes	Benign Prostatic Hypertrophy, Prostatitis, Retention, Catheterisation, Biopsy, pressure or manipulation of prostate.
<b>AFP</b>	Liver	In high risk groups e.g. cirrhosis	Yes	Yes	Yes	Conditions ass'd with hepatic necrosis & regeneration
<b>AFP and hCG</b>	Germ cell tumours	No	Yes	No	Yes	AFP – Chronic Liver disease HCG–Pregnancy, other malignancies
<b>CA125</b>	Ovarian	No	Supportive with scanning if pelvic mass or ovarian cyst present. Follow NICE Guidance	Yes	Yes	Other malignancies (GI, lung, breast), ascites of any cause, endometriosis, pelvic inflammatory disease, chronic liver disease, uterine fibroids, pregnancy.
<b>CA15-3</b>	Breast	No	No	Yes	Yes	Liver disease, Benign & malignant disease of lung, GI & reproductive system
<b>CA19-9</b>	Pancreas (upper GI)	No	Supportive with scanning if pancreatic mass or cyst present	Yes	Yes	Extra-hepatic biliary obstruction, chronic liver disease, acute & chronic pancreatitis, other tumours (ovary, GI)
<b>CEA</b>	GI Tract (colorectal)	No	No	Yes	Yes	Chronic liver disease, Inflammatory bowel disease, other malignancies

## Toxicology and Drugs of Abuse service

Northumbria Healthcare has a specialist toxicology section which is able to provide a wide range of analyses.

**Drugs of abuse.** Screening is provided on a routine basis and is available on random urine in a white capped universal. The classes of drugs included in the routine screen are Amphetamines, Benzodiazepines, Cannabinoids, Cocaine, EDDP (Methadone metabolite), and Opiates. Individual samples required for clinical purposes should be submitted to the lab as for any other request. If you wish to use the service on a regular basis from outside Northumbria Trust (e.g. as part of a Drug Action Team initiative or for occupational purposes) please contact Nigel Brown at Wansbeck Hospital 01670 592714 (ext 3714) to discuss. Turnaround times are generally within 48 hours.

**Suspected poisoning.** Toxicological investigations are available for a range of possible compounds which may have been ingested deliberately or accidentally. In the case of **ethylene glycol** or **methanol** a blood sample should be collected into a fluoride oxalate tube (as for blood glucose) and contact the lab to discuss. Where the potential substance is uncertain (e.g. drink spiking) a random urine (in a white capped universal) collected at presentation is the best initial sample although a blood sample collected at the same time may also be helpful. If presentation is more than 18 hours after the alleged spiking incident, contact Nigel Brown (Wansbeck ext 3714) as soon as possible to discuss sample requirements.

Investigations out of hours are only available after discussion; contact the On Call Consultant Clinical Chemist via the switchboard.

The toxicology section also undertakes investigations in cases referred to the Coroner but these will be arranged by the Coroners Officer or by the Police.

## Alphabetic listing of Clinical Chemistry Tests

Listed below are tests done in clinical chemistry or sent away to other clinical chemistry laboratories.

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

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\*Where the assay laboratory is indicated as other than Northumbria, queries about sample collection, results, interpretation or any other issues should be via the Northumbria Trust laboratories and not direct to the referral lab.

\*\*Target turnaround times given are for routine samples and for time from receipt in lab to completion of technical validation. For tests done within Northumbria Trust the time to results may often be shorter. If a faster turnaround time is required for a particular patient, please contact the Northumbria lab by telephone. The target turnaround time for emergency analyses is 1 hour.

Test	Specimen (see below)	Assay Laboratory*	Target Turnaround time**	Notes
<b>A</b>				
<b>ACE</b>	SST	Newcastle	1 to 2 weeks	See Angiotensin Converting enzyme
<b>ACTH</b>	EDTA	Newcastle	1 to 2 weeks	Transport to lab on ice immediately
<b>Alanine Aminotransferase (ALT)</b>	SST	Northumbria	4 hours	Part of LFT profile
<b>Albumin</b>	SST	Northumbria	4 hours	Part of LFT and Bone profiles
<b>Albumin/Creatinine Ratio ACR (Urine)</b>	EMU or random urine (white cap universal)	Northumbria	12 hours	EMU preferred
<b>Alcohol (blood)</b>	Fluoride Oxalate or SST	Northumbria	4 hours	
<b>Alcohol (urine)</b>	Random Urine (white cap universal)	Northumbria	24 hours	

<b>Aldosterone</b>	EDTA	Newcastle	1 to 2 weeks	Transport to lab within 30 mins – not on ice if Renin also requested
<b>Alkaline Phosphatase</b>	SST	Northumbria	4 hours	Part of LFT profile
<b>Alkaline Phosphatase Isoenzymes</b>	SST	Newcastle	2 to 3 weeks	Only sent if Total Alk Phos is significantly raised relative to gamma GT
<b><math>\alpha</math>1-Acid glycoprotein (orosomuroid)</b>	SST	Northumbria	24 hours	
<b><math>\alpha</math>1-Anti Trypsin &amp; Pi Typing</b>	SST	Sheffield	1 to 2 weeks	A1AT quantitation is performed initially and followed by Pi typing if appropriate
<b>Alpha feto protein</b>	SST	Northumbria	24 hours	When used as a tumour marker (Maternal screening samples dealt with by Northern Genetics, Newcastle)
<b>17-Alpha Hydroxyprogesterone</b>	SST	Newcastle	1 to 2 weeks	
<b>Aluminium</b>		Newcastle	3 to 4 weeks	Contact lab for tube and collection kit
<b>AMH (Anti Mullerian Hormone)</b>	Lithium Hep	Newcastle		
<b>Amino Acids (urine or serum)</b>	Random Urine (white capped universal) or SST	Newcastle	2 to 3 weeks	Urine or blood specimens must be sent to the lab without delay
<b>Ammonia</b>	EDTA or Lithium Hep (adult) Li Hep capillary (neonate or child)	Northumbria	4 hours	Send on ice, phone lab. A second, unused, sample container should also be sent to the lab to act as a blank
<b>Amylase (serum)</b>	SST	Northumbria	4 hours	
<b>Amylase (urine)</b>	Random Urine (white capped universal)	Northumbria	12 hours	Send serum sample as well
<b>Androstenedione</b>	SST	Newcastle	1 to 2 weeks	
<b>Angiotensin converting enzyme (ACE)</b>	SST	Newcastle	1 to 2 weeks	
<b>Aspartate aminotransferase (AST)</b>	SST	Northumbria	24 hours	

<b>B</b>				
<b>Bence Jones Protein</b>	EMU or Random Urine (white capped universal)	Northumbria	4 days	EMU preferred
<b>Bicarbonate</b>	SST	Northumbria	4 hours	Cannot be added to a sample which has already been analysed for other tests
<b>Bile Acids</b>	SST	Newcastle	1 week	Results will be telephoned within 2 to 3 working days
<b>Bilirubin</b>	SST	Northumbria	4 hours	Part of LFT Profile
<b>Blood Gases</b>	Arterial blood in syringe	Northumbria	Immediately	Send directly to lab (preferably not in air tube). Avoid air bubbles. Remove needle
<b>C</b>				
<b>CA125</b>	SST	Northumbria	24 hours	Ovarian tumour marker
<b>CA15-3</b>	SST	Northumbria	24 hours	Breast tumour marker
<b>CA19-9</b>	SST	Northumbria	48 hours	Pancreatic tumour marker
<b>Cadmium</b>		Birmingham	1 to 2 weeks	
<b>Caeruloplasmin</b>	SST	Newcastle	1 to 2 weeks	
<b>Calcitonin</b>	SST or Lithium Hep (See also Gut hormone entry)	Newcastle	1 to 2 weeks	Send on ice to lab as soon as possible, phone lab
<b>Calcium (total)</b>	SST	Northumbria	4 hours	
<b>Calcium (ionised)</b>	Separate SST	Newcastle	1 to 2 weeks	Full tube required , no other tests can be done on the same sample
<b>Carbamazepine</b>	SST	Northumbria	24 hours	
<b>Carboxyhaemoglobin</b>	EDTA or Blood Gas sample	Northumbria	12 hours	In cases of suspected exposure, sample must be taken as soon as possible as breathing air or oxygen can quickly reduce COHb in circulation
<b>Carcinoembryonic Antigen (CEA)</b>	SST	Northumbria	24 hours	GI tumour marker
<b>Carnitine</b>	EDTA or Guthrie card	Newcastle	2 to 3 weeks	

<b>(Catecholamines )</b>	No longer routinely available			See Metadrenaline
<b>Chloride</b>	SST	Northumbria	4 hours	
<b>Cholesterol</b>	SST	Northumbria	4 hours	
<b>Cholinesterase</b>	EDTA	Bristol	2 to 3 weeks	To check for suxamethonium apnoea
<b>Chromium (Urine)</b> <b>Chromium (Blood)</b>	Random urine EDTA	Birmingham	1 to 2 weeks	If industrial screen, collect after last shift of week
<b>Chromogranin A</b>	EDTA	Belfast	2 to 3 weeks	On ice, part of Gut Hormones
<b>Cobalt (blood)</b>	EDTA	Birmingham	1 to 2 weeks	
<b>Complement (C3 and C4)</b>	SST	Northumbria	48 hours	
<b>Copper (Serum)</b>	SST	Newcastle	1 to 2 weeks	
<b>Copper (Urine)</b>	24h Urine	Birmingham	1 to 2 weeks	
<b>Cortisol</b>	SST	Northumbria	24 hours	
<b>Cortisol (Urine)</b>	24h Urine	Newcastle	1 to 2 weeks	
<b>C-Peptide</b>	SST	Newcastle	1 to 2 weeks	On ice, contact lab
<b>Creatine Kinase (CK)</b>	SST	Northumbria	4 hours	
<b>Creatinine</b>	SST	Northumbria	4 hours	Part of U/E Profile
<b>Creatinine Clearance</b>	24 h Urine / SST	Northumbria	24 hours	Collect blood sample during 24h urine collection. Generally replaced by eGFR as part of U&E on serum
<b>C-Reactive Protein (CRP)</b>	SST	Northumbria	4 hours	
<b>Cryoglobulins</b>	Plain @ 37°C	Northumbria	72 hours	Contact lab for details of specimen collection
<b>CSF Glucose</b>	Fluoride Oxalate	Northumbria	4 hours	
<b>CSF Lactate</b>	Fluoride Oxalate	Northumbria	4 hours	
<b>CSF Protein</b>	Universal	Northumbria	4 hours	
<b>CSF Bilirubin</b>	See Protocol	Northumbria	8 hours	Special collection protocol & kit available from lab
<b>Ciclosporin</b>	EDTA	Newcastle	1 to 2 weeks	Trough level preferred. Arrange in advance if weekend analysis required
<b>Cystine (Urine)</b>	24h Urine	Newcastle	2 to 3 weeks	Random urine acceptable in children

<b>D</b>				
<b>Direct/Conjugated Bilirubin</b>	SST	Northumbria	4 hours	
<b>DHEAS</b>	SST	Newcastle	1 to 2 weeks	
<b>Digoxin</b>	SST	Northumbria	4 hours	Take sample at least 6 hours after dose. Give dose/time details on request
<b>E</b>				
<b>Ethylene Glycol + Glycolic acid</b>	Fluoride oxalate or urine	Northumbria	By arrangement	Phone lab to discuss
<b>F</b>				
<b>Faecal Elastase</b>	Faeces (plain universal)	Newcastle	1 to 2 weeks	Sample must contain some solid matter
<b>Faecal Occult Blood (FOB)</b>	Not routinely available			
<b>Faecal Reducing Substances</b>	Not routinely available			
<b>Faecal Calprotectin</b>	Faeces (plain universal)	Northumbria	1 week	
<b>Fluid Tests (i.e TP, U/E etc)</b>	White capped Universal	Northumbria	4 hours	Indicate what type of fluid on request form
<b>Fluid Glucose</b>	Fluoride Oxalate	Northumbria	4 hours	
<b>Fluid pH</b>	Blood gas syringe	Northumbria	2 hours	Only available on pleural fluids
<b>FSH</b>	SST	Northumbria	12 hours	
<b>G</b>				
<b>Gamma GT</b>	SST	Northumbria	4 hours	
<b>eGFR</b>		Northumbria	4 hours	Calculated as part of GP or outpatient U&E. If required on in-patient, contact lab
<b>Glucose</b>	Fluoride Oxalate	Northumbria	4 hours	
<b>Growth Hormone</b>	SST	Newcastle	1 to 2 weeks	
<b>Gut Hormones</b>	EDTA on ice (multiple tubes required)	Belfast	3 to 4 weeks	Contact lab for collection details
<b>H</b>				
<b>Haemochromatosis Genotyping</b>	EDTA	Newcastle	2 to 3 weeks	Sample cannot be used for any other tests
<b>HbA1c</b>	EDTA	Northumbria	24 hours	Send separate sample for FBC if required

<b>HCG</b>	SST	Northumbria	12 hours	For use as tumour marker and in specific pregnancy situations (e.g. ectopic pregnancy) Not for use as general pregnancy test.
<b>HDL Cholesterol</b>	SST	Northumbria	4 hours	Fasting sample
<b>HIAA (Urine)</b>	Overnight or 24h urine	Newcastle	1 to 2 weeks	Obtain urine bottle containing preservative (sand & acid) from laboratory
<b>HMMA (urine) HVA</b>	Random urine	Newcastle	1 to 2 weeks	Used in children under 8 years
<b>I</b>				
<b>Ionised calcium</b>	SST	Newcastle	1 to 2 weeks	Full tube required , no other tests can be done on the same sample
<b>Immunoglobulins G,A,M</b>	SST	Northumbria	48 hours	If not checked previously, will usually also have a paraprotein screen performed
<b>IgE</b>	SST	Northumbria	24 hours	
<b>Insulin</b>	SST and Fluoride Oxalate	Newcastle	2 to 3 weeks	Transport Insulin sample to lab immediately on ice. Send fluoride oxalate tube and request glucose at the same time Contact lab for sample collection protocol
<b>Intermediary Metabolites</b>	PCA	Newcastle	2 to 3 weeks	Special tube and collection details available from laboratory
<b>Iron</b>	SST	Northumbria	4 hours	Only requested without transferrin for iron overdose cases
<b>L</b>				
<b>Lactate</b>	Fluoride Oxalate	Northumbria	4 hours	Send to lab immediately
<b>Lactate Dehydrogenase (LD)</b>	SST	Northumbria	24 hours	
<b>Lead</b>	EDTA	Birmingham	2 to 3 weeks	
<b>LFT</b>	SST	Northumbria	4 hours	Bil, ALP, ALT, TP, Alb
<b>LH</b>	SST	Northumbria	12 hours	
<b>Lithium</b>	SST	Northumbria	12 hours	Sample at least 12 hours post dose

<b>M</b>				
<b>Magnesium</b>	SST	Northumbria	4 hours	
<b>Metadrenalines (urine)</b>	Overnight or 24 hr urine	Newcastle	1 to 2 weeks	Obtain urine bottle containing preservative (sand & acid) from laboratory
<b>Metanephrines (plasma)</b>	EDTA	Newcastle	1 to 2 weeks	Transport to lab immediately on ice. Only usually requested once urine screen has identified possible problem.
<b>Mercury (Urine)</b>	Random or 24 hr urine	Birmingham	1 to 2 weeks	Sample of choice for chronic exposure to vapour or inorganic salts. Analysis of urine or blood has <b>not</b> proved useful in people concerned about dental amalgams
<b>Mercury (Blood)</b>	EDTA or Lithium Hep	Birmingham	1 to 2 weeks	Sample of choice for exposure to organic mercury compounds or acute exposure to vapour or inorganic salts
<b>Microalbumin</b>				See Albumin / creatinine ratio
<b>N</b>				
<b>NT-proBNP</b>	SST	Northumbria	4 days	
<b>O</b>				
<b>Oestradiol</b>	SST	Northumbria	12 hours	
<b>Osmolality</b>	SST	Northumbria	4 hours	
<b>Osmolality (urine)</b>	Random (white capped universal)	Northumbria	4 hours	A fresh sample is best. A sample for serum osmolality should be sent to the lab at the same time
<b>P</b>				
<b>Paracetamol</b>	SST	Northumbria	4 hours	In overdose situations, sample 4 hours after ingestion
<b>Paraprotein Screen</b>	SST	Northumbria	3 days	(See Bence Jones Protein for urine paraprotein screen)
<b>Parathyroid Hormone</b>	EDTA (separate tube required)	Northumbria	4 days	Send to lab within 2 hours, also request calcium on SST sample
<b>Phenobarbitone</b>	SST	Northumbria	12 hours	Trough sample recommended
<b>Phenytoin</b>	SST	Northumbria	12 hours	Trough sample recommended

<b>Phosphate</b>	SST	Northumbria	4 hours	
<b>Porphyrin Profile</b>	Blood, Urine and Faeces	Cardiff	1 to 2 weeks	For investigation of full spectrum of porphyrias. Wrap all samples in foil, black plastic or paper bag to protect from light
<b>Porphyrin Screen (for acute porphyrias during possible attack only)</b>	Random Urine	Northumbria	12 hours	Send directly to lab. Protect from light
<b>Potassium</b>	SST	Northumbria	4 hours	
<b>Progesterone</b>	SST	Northumbria	24 hours	
<b>Prolactin</b>	SST	Northumbria	24 hours	Samples with raised levels will be checked for the presence of macroprolactin and this will delay the turnaround time
<b>Prostate Specific Antigen (PSA)</b>	SST	Northumbria	12 hours	
<b>Protein/creatinine ratio (PCR)</b>	EMU or random urine (white capped universal)	Northumbria	24 hours	
<b>R</b>				
<b>Renin</b>	EDTA	Newcastle	1 to 2 weeks	Contact lab for protocol. Send to lab immediately (NOT on ice)
<b>S</b>				
<b>Salicylate</b>	SST	Northumbria	4 hours	
<b>SHBG</b>	SST	Northumbria	Weekly	
<b>Sodium</b>	SST	Northumbria	4 hours	
<b>T</b>				
<b>TSH (Thyroid Profile)</b>	SST	Northumbria	12 hours	Free T4 and FreeT3 will be added as cascade tests as appropriate
<b>Tacrolimus (FK506)</b>	EDTA	Newcastle	1 to 2 weeks	
<b>Testosterone</b>	SST	Northumbria	24 hours	
<b>Theophylline</b>	SST	Northumbria	24 hours	
<b>Troponin T</b>	SST	Northumbria	2 hours	Haemolysed samples are unsuitable for analysis.
<b>Total protein</b>	SST	Northumbria	4 hours	Part of LFT profile

<b>TPMT</b>	EDTA (needs to be full)	Birmingham	1 to 2 weeks	Used prior to azathioprine therapy
<b>Triglycerides</b>	SST	Northumbria	4 hours	Fasting sample preferred
<b>Tryptase</b>	SST	Newcastle	1 to 2 weeks	Take at 1 and 24 hrs hours after possible anaphylactic shock
<b>U</b>				
<b>U &amp; E (and eGFR on OP and GP patients)</b>	SST	Northumbria	4 hours	Sodium, Potassium, urea, creatinine (urgent in patient samples will also get bicarbonate and chloride)
<b>Urea</b>	SST	Northumbria	4 hours	Part of U&E
<b>Urate</b>	SST	Northumbria	4 hours	
<b>Urine tests (electrolytes, calcium, protein, magnesium, uric acid etc)</b>				Contact lab for appropriate 24 hour collection bottle
<b>V</b>				
<b>Valproate</b>	SST	Northumbria	24 hours	Monitoring <b>not</b> recommended in epilepsy therapy. Measurement may be useful in some cases of bipolar disorder.
<b>Vitamin A and E</b>	SST, Lithium Hep or EDTA	Rotherham	1 to 2 weeks	Protect from light
<b>Vitamins B1, B2 and B6</b>	EDTA or Lithium Heparin	Glasgow	1 to 2 weeks	Samples must arrive in the lab during the morning, Monday to Wednesday to allow for sample processing and transport. Handled by Haematology
<b>Vitamin D</b>	SST	Northumbria	Daily	Sample must arrive at lab on same day
<b>Z</b>				
<b>Zinc</b>	SST	Newcastle	1 to 2 weeks	Haemolysed samples are unsuitable

Specimen Types

EDTA	Purple topped vacutainer
Fluoride Oxalate	Grey topped vacutainer
Lithium Heparin	Green topped vacutainer
Plain	Red topped vacutainer
SST	Gold topped vacutainer (Serum Separator tube)

**NHS GENERAL**  
**NORTHUMBRIA HEALTHCARE NHS FOUNDATION TRUST**  
**DEPARTMENT OF Clinical Chemistry**

**REFERRED TESTS**

<b>Address</b>	<b>Accreditation</b>	<b>Tests referred</b>
Regional Regulatory Peptide Laboratory, 2 <sup>nd</sup> Floor, Kelvin Building Royal Victoria Hospital <b>Belfast</b> BT12 6BA Tel: Dr J Ardill, 028 9063 2735 NB SAMPLES SENT FROZEN VIA RVI	CPA No. 1338  FULL (at 04/04/12)	Calcitonin gene related peptide Carcinoid Screen Blood Chromogranin A Gastrin, Gastrin releasing peptide Glucagon Gut Hormones Neurokinin A Pancreastatin Pancreatic Polypeptide
Dept of Clinical Biochemistry Selly Oak Hospital <b>Birmingham</b> B29 6JD 0121 627 8108	CPA No. 0333  Full (at 04/04/12)	Alpha Sub Unit
Dr George Grey or Elizabeth Walker Clinical Chemistry Laboratory Medicine Block Children's Hospital Whittall Street Birmingham B4 6NL Tel: 0121 333 9912 Fax: 0121 333 9911	CPA No. 1288  Full (at 04/04/12)	Steroid sulphatase
Dept Clinical Biochemistry City Hospitals NHS Trust Dudley Road <b>Birmingham</b> B18 7QH Tel: 0121 507 5353 or 0121 507 4271 Contact Loretta Ford <a href="http://www.cityassays.org.uk">www.cityassays.org.uk</a>	CPA No. 1267  Full (at 04/04/12)	TPMT (Thiopurine S-methyltransferase)

## NHS GENERAL

<p>Regional Toxicology Lab City Hospitals NHS Trust Dudley Road <b>Birmingham</b> B18 7QH Contact: Dr Robin Braithwaite/Mr T M T Sheeham Email: <a href="http://www.toxlab.co.uk">www.toxlab.co.uk</a> Tel: 0121 507 4134 or 0121 507 6028</p>	<p>CPA No. 1267  Full  (at 04/04/12)</p>	<p>Arsenic            Blood Cadmium          Blood/ Urine Chromium        Blood / Urine Cobalt            Blood / Urine Selenium (Serum or urine) Zinc protoporphyrin (ZPP) Lead Manganese Nickel            Serum</p>
<p>Newborn Screening &amp; Biochemical Genetics Dept Blood Sciences Laboratory Southmead Hospital Westbury-on-Trym <b>Bristol</b> BS10 5NB Contact: Ann Brown/Mark de Hora Email: <a href="mailto:ann.brown@north-bristol.swest.nhs.uk">ann.brown@north-bristol.swest.nhs.uk</a> Tel No. 0117 323 5556 / 8376 Cholinesterase queries 0117 959 6083, Dr Roberta Goodall</p>	<p>CPA NO. 0034  Full  (at 04/04/12)</p>	<p>Cholinesterase GAL-1-PUT ( Galatose -1- phosphate uridyl transferase) Galactose -1-phosphate</p>
<p>Dept of Clinical Biochemistry, Box 232 Addenbrooke's Hospital, Hills Road <b>Cambridge</b> CB2 0QQ Tel 01223 216862 <a href="mailto:Sharon.knights@addenbrookes.nhs.uk">Sharon.knights@addenbrookes.nhs.uk</a> <a href="http://www.addenbrookes.nhs.uk">www.addenbrookes.nhs.uk</a></p>	<p>CPA No. 0244  Full  (at 04/04/12)</p>	<p>Leptin</p>

## NHS GENERAL

<p>(Purine Lab) Medical Biochemistry &amp; Immunology University Hospital of Wales Heath Park <b>Cardiff</b> CF14 4XW Contact: Dr M Badminton/Ms J Woolf (The Porphyria Service) or Dr Ian McDowell (homocysteine) Email: mike.badminton@cardiffandvale.wal es.nhs.uk Tel 029 2074 2809 or 2074 3565 ApoE Contact 029 2074 8350 Porphyria Service website <a href="http://www.cardiff-porphyria.org">www.cardiff-porphyria.org</a>, e-mail <a href="mailto:porphyria@cardiffandvale.wales.nhs.uk">porphyria@cardiffandvale.wales.nhs .uk</a></p>	<p>CPA No. 0841  Full  (at 04/04/12)</p>	<p>Apolipoprotein E genotyping Homocysteine (as CHD risk factor) Porphyrin profile,</p>
<p>Health Protection Agency The Wolfson Unit Claremont Place <b>Newcastle University</b> NE2 4AA Tel: 0191 222 7015/7016 Email: Peter.Casson@ncl.ac.ul Email: D.B.Henderson@ncl.ac.uk</p>	<p>No Participates in UKNEQAS for lead.</p>	<p>DDT</p>
<p>Biochemistry Department Freeman Hospital <b>Newcastle upon Tyne</b> NE7 7DN Tel: 0191 2336161</p>	<p>CPA No. 0925  Full  (at 04/04/12)</p>	<p>5HIAA (5- hydroxyindole acetic acid) Aluminium Beta crosslaps Ciclosporin CK-MB Copper           Blood DPD Faecal Elastase HVA Ionised Calcium Lipase Metadrenaline Tacrolimus (FK 506) Zinc</p>
<p>Haematology Dept. Freeman Hospital <b>Newcastle upon Tyne</b> NE7 7DN Tel: 0191 2137688</p>	<p>CPA No. 0926  Full  (at 04/04/12)</p>	<p>Vitamin C</p>

## NHS GENERAL

Clinical Biochemistry Queen Elizabeth Hospital <b>Gateshead</b> NE9 6SX Contact: Dr G Handley/Phil Johnson/Caroline Addison Email: graham.handley@ghnt.nhs.uk Tel: 0191 445 2290/2284	CPA No. 1481  Full  (at 04/04/12)	Beta 2 microglobulins SCC (SCCA; Squamous Cell Cancer Antigen)
Institute of Human Genetics International Centre for Life Times Square Central Parkway <b>Newcastle upon Tyne</b> , NE1 3BZ Tel: 241 8600 (CF typing 241 8754)	CPA No. 2212  Full  (at 04/04/12)	Chromosome Typing or Cystic Fibrosis Gene Haemochromatosis genotyping (HFE genotyping)
Dept. of Clinical Biochemistry Glasgow Royal Infirmary University NHS Trust MacEwen Building 84, Castle St <b>Glasgow</b> G4 0SF Contact Dr G Beastall Tel 0141 211 4638	CPA No. 2335  Full  (at 04/04/12)	Carotene 1,25-OH Vitamin D
Scottish Trace Element and Micronutrient Unit Department of Clinical Biochemistry Glasgow Royal Infirmary PO Box 508 <b>Glasgow</b> G31 2EZ Tel: 0141 211 5178	CPA 2335  Full  (at 04/04/12)	Hepatic Iron Index Vitamin B1 (Thiamine) Vitamin B2 (Riboflavin) Vitamin B6 (Pyridoxine) Vitamin Assays (B1, B2, B6)
Specialist Biochemistry Section Clinical Biochemistry Hull Royal Infirmary Anlaby Road Hull HU3 2JZ Tel: 01482 607753 Contact Heidi Cox	CPA 0407  Full  (at 04/04/12)	Fructosamine HbA1c by Boronate Affinity

**NHS GENERAL**

<p>(SAS Centre for Steroid Hormones)                  Dept of Clin. Biochemistry &amp; Immunology                  Old Medical School                  Leeds General Infirmary                  Great George St  <b>Leeds</b>                  LS1 3EX                  SEND FROZEN SAMPLES VIA RVI                  Contact: Julian Barth                  Email: <a href="mailto:Julian.Barth@leedsth.nhs.uk">Julian.Barth@leedsth.nhs.uk</a>                  Tel: 0113 392 3607 (results)                  0113 392 3517 (endocrinology lab)</p>	<p>CPA 1756                   Full                   (at 02/05/12)</p>	<p>Oestrone                  Testosterone (Mass Spec)</p>
<p>Metabolic Section                  Specialist Laboratory Medicine                  Block 46                  St James University Hospital  <b>Leeds</b>                  LS9 7TF                  Contact Douglas Thompson                  Tel 0113 392650</p>	<p>CPA No 1756                   Full                   (at 02/05/12)</p>	<p>Serotonin (and Plasma 5HIAA)</p>
<p>Dr Mitchell                  Dept of Pharmacology &amp; Toxicology                  Medical School, Norfolk Place  <b>London W2 1PG.</b></p>		<p>Avaxetine                  Ethosuxamide                  Flecainide                  Mercury Blood                  Vigabatrin</p>
<p>Chemical Pathology Dept                  Great Ormond Street Hospital                  Gt Ormond St  <b>London</b>                  WC1N 3JH                   Tel 02074059200 ext 5009 General                  Queries                  Ext 5076 Result                  enquiries   <a href="http://www.gosh.nhs.uk/gosh/services/chemicalpathology">www.gosh.nhs.uk/gosh/services/chemicalpathology</a> for lab handbook</p>	<p>CPA No. 0250                   Full                   (at 04/04/12)</p>	<p>CK isoenzymes                  (electrophoresis)</p>
<p>Dept. of Clinical Biochemistry                  Kings College Hospital                  Denmark Hill  <b>London, SE5 9RS</b>                  Tel: 0207 737 4000</p>	<p>CPA No. 1245                   Full                   (at 04/04/12)</p>	<p>Steroid Profile</p>

<p>Purine Research Laboratory 4<sup>th</sup> Floor, North Wing St Thomas' Hospital Lambeth Palace Road <b>London</b> SE1 7EH Contact for ADA: Dr Lynette Fairbanks Tel : 0207 188 1266 e-mail <a href="mailto:Lynette.fairbanks@kcs.ac.uk">Lynette.fairbanks@kcs.ac.uk</a> Tony Marinaki 0207 188 1265 Fax 1280</p>	<p>CPA No. 1867  Full  (at 04/04/12)</p>	<p>Adenosine deaminase</p>
<p>Pharmacology, and Therapeutics Unit Institute of Neurology Room 825 Queen Square House Queen Square <b>London</b> WC1N 3BG Contact: Dr N Ratnaraj/Prof P N Patsalos Email: <a href="mailto:P.Patsalos@ion.ucl.ac.uk">P.Patsalos@ion.ucl.ac.uk</a> Tel: 020 3456 7890</p>		<p>Oxcarbazepine</p>
<p>Immunology Dept Institute of Neurology Queen Square <b>London</b> WC1N 3BG Tel : 020 3456 7890</p>	<p>CPA No 1839  Full  (at 04/04/12)</p>	<p>Transferrin isoforms</p>
<p>Protein Ref Unit St George's PO Box 10295 St Georges's Hospital Medical School Cranmer Terrace London SW17 0NH Tel 020 8725 0025</p>	<p>CPA No 1929  Full  (at 04/04/12)</p>	<p>Faecal Alpha 1-antitrypsin</p>
<p>Clinical Biochemistry UCL Hospitals, 3<sup>rd</sup> Floor 60 Whitfield Street <b>London</b> W1T 4EU Contact: Dr J Honour/Mr I Phillips Email: <a href="mailto:john.honour@uclh.org">john.honour@uclh.org</a> Tel: 0845 155 5000 Ext 2956 Fax: 0207 380 9584</p>	<p>CPA No 1173  Full  (at 04/04/12)</p>	<p>Citrate Oxalate Oxalate – plasma</p>

## NHS GENERAL

Liverpool Neurobiochemistry Department Buxton Laboratory W.C.N.N. Lower Lane <b>Liverpool</b> L9 7LJ Contact: Dave Waring/Danny O'Connell Email: <a href="mailto:dave.waring@thewaltoncentre.nhs.uk">dave.waring@thewaltoncentre.nhs.uk</a> Tel: 0151 529 5577	CPA No. 1941  Full  (at 04/04/12)	Beta Transferrin
Dept Clinical Biochemistry 4th Floor Duncan Building Royal Liverpool University Hospital Prescot Street Liverpool L7 8XP	CPA No 0771  Full  (at 04/04/12)	Testosterone (Bioavailable)
Department of Clinical Biochemistry University Hospital South Manchester Southmoor Road Wythenshawe Manchester M23 9LT		Prednisolone
Willink Biochemical Genetics Unit 6 <sup>th</sup> Floor, Pod 1 St Mary's Hospital Oxford Road <b>Manchester</b> M13 9WL Tel: 0161 701 2137/38 Blood spot $\alpha$ galactosidase Contact Mr Alan Cooper e-mail ; <a href="mailto:alan.cooper@cmmc.nhs.uk">alan.cooper@cmmc.nhs.uk</a> Website: <a href="http://www.mangen.co.uk/biochemical-genetics.asp">www.mangen.co.uk/biochemical-genetics.asp</a>	CPA No. 2766  Conditional  (at 04/04/12)	Alpha Galactosidase Mucopolysaccharides,2-D Mucopolysaccharide electrophoresis
Dept of Medicine / ESGR University of Manchester Room 3.825 The Stopford Building Oxford Road <b>Manchester</b> M13 9PT Tel: 0161 2755178 (Prof Anne White	Research lab not accredited	POMC (Pro-opiomelanocortin)

Medical Physics Freeman Hospital <b>Newcastle upon Tyne</b> NE7 7DN Contact: T Hawkins Tel: 0191 2336161 / 26464	CPA No 0925  Full  (at 04/04/12)	PABA
Specimen Reception Laboratory Medicine, Level 1 East Block Norfolk and Norwich University Hospital Colney Lane <b>Norwich</b> NR4 7UY Contact Sr A Chipchase Tel: 01603 289419 Email: Allison.chipchase@nnuh.nhs.uk	CPA No 0868  Full  (at 16/08/12)	Parathyroid Hormone rp (PTHrp)
Biochemistry Department Queen Elizabeth Hospital Sheriff Hill <b>Gateshead on Tyne</b> NE9 6XS Tel. 0191 445 2290/2284 <a href="mailto:Graham.handley@ghnt.nhs.uk">Graham.handley@ghnt.nhs.uk</a>	CPA No. 1481  Full  (at 04/04/12)	Beta 2 microglobulins SCC (SCCA; Squamous Cell Cancer Antigen)
Biochemistry Dept Rotherham General Hospital Moorgate Rd <b>Rotherham</b> S Yorks S60 2UD Contact: Robert Ellis Email: <a href="mailto:robert.ellis1@rothgen.nhs.uk">robert.ellis1@rothgen.nhs.uk</a> Tel. 01709 304103	CPA No. 0013  Full  (at 04/04/12)	Vitamins A and E

**NHS GENERAL**

<p>Clinical Biochemistry          Royal Victoria Infirmary          Queen Victoria Road  <b>Newcastle upon Tyne</b>          NE1 4LP          Contact: Julie Day / Steve Turner          Email:          Steve.Turner@nuth.northy.nhs.uk          Tel: 0191 282 4025/ 227 5135 or          8782 25023          Results( 282 5023)          Duty Biochemist 0191 2829719</p>	<p>CPA No. 0925           Full           (at 04/04/12)</p>	<p>17-Alpha Hydroxyprogesterone          ACE (Angiotensin Converting enzyme)          ACTH (Adrenocorticotrophic hormone)          ADH          Aldosterone (plasma)          ALK Phos isoenzymes          Amino acids Urine          Androstendione,          Anti Mullerian Hormone          Apolipoproteins A1 and B          Betaquant          Bile Acids          Caeruloplasmin          Calcitonin          Cortisol, Urine          Cysteine          Cystine          DHEASulphate          Growth Hormone          IGF1          IGF BP3          Insulin, C-peptide          Lipoprotein (a)          Methotrexate          Non-esterified fatty acids (NEFA)          Organic acids          Phenylalanine          Renin          TBII (thyrotrophin binding inhibiting immunoglobulin)          Thyroglobulin</p>
<p>Immunology Department          Royal Victoria Infirmary  <b>Newcastle on Tyne</b> NE1 4LP          Tel: 8782 25295</p>	<p>CPA No. 0187           Full           (at 04/04/12)</p>	<p>CSF Oligoclonal Bands          IgG Subclasses          Tryptase</p>
<p>Spence Biochemical Genetics Unit          Department of Clinical Biochemistry,          RVI  <b>Newcastle on Tyne</b> NE1 4LP          Tel/Fax: RVI (0191 2336161) ext          20334 (phone to let them know          when taxi is arranged)          Direct Line 0191 2820334</p>	<p>CPA No 0925           Full           (at 04/04/12)</p>	<p>Acylcarnitine          Biotinidase          Carnitine/Carnitine profile          Intermediary Metabolites          (including Pyruvate, Lactate and          beta hydroxybuterate)</p>

## NHS GENERAL

Trace Element Lab Chemical Pathology, Mail Point 804 Level D Southampton General Hospital Tremona Road Southampton, Hants SO16 6YD	CPA No. 1004 Full  (at 04/04/12)	Molybdenum Red Cell Magnesium
Sheffield Immunology & Protein Reference Unit Department of Immunology P O Box 894, <b>Sheffield</b> S5 7AU (# 6566) Tel: 0114 2715552 Fax: 0114 2619893 (Dr Graham Wilde)	CPA No. 0113 Full  (at 04/04/12)	Alpha 1-antitrypsin/ C1 Esterase inhibitor Carbohydrate deficient transferrin Pro-collagen Type 3
Dept Clinical Biochemistry Children's Hospital Western Bank <b>Sheffield</b> S10 2TH Dr Jim Bonham Tel: 0114 2717404	CPA No. 0001 Full  (at 04/04/12)	Trimethylamine Trimethylamine-N-OX Phosphoethanolamine (Urine PEA) 7-Dehydrocholesterol
Department of Biochemistry Sunderland Royal Hospital, Kayll Road <b>Sunderland</b> SR4 7TP, Contact: David Burgess Tel: 0191 565 6256 Ext 42807 or #6224	CPA No. 0662 Full  (at 04/04/12)	Calculus Macroprolactin
Dr G Wark SAS Peptide Section Clinical Laboratory, Level B Royal Surrey County Hospital Egerton Road <b>Guildford</b> Surrey GU2 7XX Contact: Dr Gwen Wark/Nicholas Porter Email: gwark@royalsurrey.nhs.uk Tel: 01483 406715 Fax: 01483 464072 Trace elements 01483 259978	CPA No. 1167 Full  (at 16/08/12)	Insulin C peptide Insulin autoantibodies
Centre for Clinical Science and Measurement School of Biological Sciences University of Surrey Guildford GU2 7XH	CPA No. 1167 Full  (at 16/08/12)	Silver

**NHS GENERAL**

St Thomas Hospital, Chem. Path. Dept Guys & St Thomas NHS Trust 5th Floor, North Wing Lambeth Palace Road <b>London</b> SE1 7EH Tel: 020 7188 7188 ext 81240 (Lab) /81285 (sec)	CPA No 0803  Full (at 04/04/12)	11-Deoxycortisol
Chemical hazards & Poisons Division Wolfson Unit Claremont Place <b>Newcastle</b> NE2 4AA Contact Dr Michael Dunn	Not Accred	DDT

Current reference ranges for Northumbria

Spec	Expanded	Telepath	Units	d.p	Age range	Telepath Range	Abnormal	Ranges as comments	Delta	Date
Type	Test name	Testcode					Limits	(in place of ref range)	Limits	of intro
	<b>U&amp;E</b>									
S	Sodium	Na	mmol/l	0	Up to 1m	130-145				
					1m - 1y	132-142				
					>1y	133-146	130 - 150		+/- 4	05/07/2010
S	Potassium	K	mmol/l	1	Up to 1m	3.8 - 7.0				
					1m - 1y	4.0 - 6.0				
					>1y	3.5 - 5.3	3.0-5.5		+/- 0.5	05/07/2010
S	Chloride	CL	mmol/l	0	Up to 3m	95 - 112				
					> 3m	95-108	90-110		+/- 5	05/07/2010
S	Total CO2	CO2	mmol/l	0	Up to 1m	14 - 32				
					1m - 4y	15 - 28				
					4y - 9y	20 - 30				
					>9y	22 - 29	12 - 35		+/- 5	
S	Urea	U	mmol/l	1	Up to 2m	1.3 - 5.4				
					2m - 3y	1.8 - 7.5				
					>3y Male	3.1 - 7.9				
					>3y Female	2.5 - 6.4	1.0 - 20		+/- 2	
S	Creatinine	CR	umol/l	0	Up to 1w	35 - 85				
					1w - 2w	35 - 80				

					2w - 3w	35 - 75			
					3w - 4w	30 - 65			
					1m - 3y	25 - 55			
					3y - 6y	30 - 65			
					6y - 10y	35 - 70			
					10y - 13y	40 - 80			
					13y - 15y	45 - 90			
						Male Female			
					15 - 17y	55 - 105 50 - 95			
					17 - 56y	70 - 110 55 - 95			
					56 - 66y	75 - 120 65 - 105			
					66 - 76y	75 - 140 65 - 120			
					>76y	75 - 155 70 - 145	25 - 200		+/- 15
S	eGFR	eGFR	ml/min/1.73m <sup>2</sup>	0	Adult	>90		Normal GFR	
						60 - 89		Mild impairment with other evidence of chronic kidney damage	
						30 - 59		Moderate impairment	
						15 - 29		Severe impairment	
						<15		Established renal failure	
	<b>Liver and Bone</b>								
S	Total Protein	TP	g/l	0	Up to 1m	50 - 70			
					1m - 6m	52 - 72			
					6m - 1y	56 - 76			
					1y - 11y	60 - 82			
					>11y	60 - 80	<85		+/- 7





NHS GENERAL

S	Osmolality	OSM	mmol/kg	0		275 - 295				05/07/2010
S	Amylase	AMY	IU/l	0		<100	10 - 300		+/- 50	
S	Troponin T	TNTHS	ng/L			≤14				01/02/2011
S	Iron	FE	umol/l	0	Over 3y	9 - 28	5 - 40		/- 5	
							20 - 50		+/- 10	
S	Transferrin	TRF	g/l	1	>1m	2.0 - 3.6				

**NHS GENERAL**

S	Transferrin Saturation	PSAT	%	0	<16Y	15 - 50				
					M 16 - 55Y	15 - 60				
					F 16 - 55Y	15 - 55				
					All >55Y	15 - 60				
S	Ferritin	FER	ug/l	0		15 - 300				
S	Cholesterol	CHOL	mmol/l	1			3.0 - 8.0	See local guidelines for interpretation	+/- 1.0	
S	Triglycerides (fasting)	TRIG	mmol/l	1		<1.9	>5.0			
S	HDL Cholesterol	HDL	mmol/l	1	Male	>1.0	>2.0		+/-0.3	
					Female	>1.1				
S	Total/HDL Cholesterol ratio			1				See local guidelines for interpretation		
S	LDL Cholesterol	LDL	mmo/l/l	1						
S	Urate	URA	mmol/l	2	Up to 1y	0.10 - 0.50	<0.5	See local guidelines for interpretation	+/- 0.8	
					> 1y M	0.16 - 0.43				
					>1y F	0.09 - 0.36	>0.7		+/- 0.03	
S	Creatine Kinase (Total)	CK	IU/l	0	Up to 1m	< 850				
					1m - 2y	< 350				
					2y - 17y	< 250				
					>17y	M < 190				
						F < 160	>400		+/- 400	
S	NT proBNP	PROBNP	ng/L	0	<60	0 - 50	>450			Aug-11
					60 - 74	0 - 100	>900			
					>74	0 - 250	>1800			

	<b>Endocrine</b>								
S	TSH	TSH	mU/l	2	>5d	0.35 - 3.5	0.35 - 3.5		29/03/10
S	Free Thyroxine	FT4B	pmol/l	0	>5d	7.8 - 17			29/03/10
S	Free T3	FT3	pmol/L	1		3.4 - 6.0			29/03/10
S	LH	LH	U/l	1	Under 12y	< 6			
					Male >12y	1.8 - 8.2			
					Follicular			2 - 10	
					Mid-Cycle			10 - 96	
					Luteal			2 - 11	
					Post-Menop			>30	
					Pregnant	<2.0			
					Female > 55y	>20			
S	FSH	FSH	U/l	1	Under 12y	1.2 - 7.8			
					Male >12y	1.4 - 14			
					Follicular			2 - 10	
					Mid-Cycle			5 - 28	
					Luteal			2 - 8	
					Post-Menop			>30	
					Pregnant	<2			
					Female > 55y	>23			
									29/03/10
S	Prolactin	PROL	mU/l	0	Males >17yrs	<277			
					F (premen)	<564			
					F (post men)	<415			

NHS GENERAL

S	Oestradiol	E2	pmol/L	0	M >12Y	50 - 220		Follicular 90 - 720		
					F > 55Y	145		Mid cycle 240 - 510		
					F <55Y	See Comment		Luteal 150 - 960		
								Post Menopause <145		
S	Progesterone	PROG	nmol/L	0				Pre ovulation <5		
								Post Ovulation >20		
S	Testosterone	TESTO	nmol/l	1	Male 18 - 49	8.6 - 29				14/07/11
					Male >50	6.7 - 25.7				
					Female (>17Y)	<1.7				
S	Cortisol	COR	nmol/l	0	9am			Cortisol reference range -		
								9.00am 170 - 540		
S	HCG	HCG	IU/l	0	M + F, <12y	<2				
					M >12Y	<5				
					F 12-55y	<10				
					F, >55y	<5				
P	PTH	PTHP	ng/L	0		10 - 60				
S	Vitamin D	VITD	nmol/L	0		>50				
								Guidance given about lower levels as text		

**NHS GENERAL**

	<b>Tumour markers</b>								
S	AFP	AFP	KU/L	0	<7d	<100,000			
					7-14d	<80,000			
					14d - 4w	<30,000			
					5w - 9w	<7,500			
					10w - 13w	<750			
					14w - 17w	<220			
					18w - 21w	<150			
					22w - 26w	<70			
					27w - 30w	<25			
					31w - 35w	<20			
					36w - 16y	<15			
					17 - 150y	<10			
S	Prostate Specific Ag	PSA	ng/ml	1	<50	2.5			
					<60	3.5			
					<70	4.5			
					70 and over	6.5			
S	Carcino Embryonic Ag	CEA	ug/l	1		<5			
S	CA 19-9	CA199	U/ml	0		<34			
S	CA 125	CA125	kU/l	0		<35	>100		
S	CA 15-3	CA153	KU/L	0		<51			
	<b>TDM</b>								
S	Digoxin	DIG	ug/l	1		1.0 - 2.0	0.7 - 2.1		+/- 25%
S	Paracetamol	PARA	mg/l	0					
S	Salicylate	SAL	mg/l	0					

**NHS GENERAL**

S	Theophylline	THEO	mg/l	0		10 - 20				
S	Carbamazepine	CARB	mg/l	0		4 - 12	9 - 21		+/- 15%	
							3 - 15		+/- 20%	
S	Phenytoin	PHY	mg/l	0		10 - 20	9 - 20		+/- 20%	
S	Valproate	VALP	mg/l	0		50 - 100				
							49 - 101			
S	Phenobarbitone	PHENO	mg/l	0		15 - 40	14 - 41		+/- 15%	
S	Lithium	LI	mmol/l	1		0.4 - 1.0	0.4 - 1.0			
	<b>Specific Proteins</b>									
S	α-1-Acid Glycoprotein	AGP	g/l	2		0.6 - 1.2				
S	C-Reactive Protein	CRP	mg/l	0		<5				
S	C3	C3	g/L	1		0.9 - 1.8				
S	C4	C4	g/L	1		0.1 - 0.4				
S	IgG	IGG	g/l	1	<13w	None				
					14w - 26w	2.4 - 8.8				
					27w - 39w	3.0 - 9.0				
					40w - 51w	3.0 - 10.9				
					1y	3.1 - 13.8				
					2y	3.7 - 15.8				
					3y - 5y	4.9 - 16.1				
					6y - 14y	5.4 - 16.1				
					15y - 150y	6.0 - 16.0	3 - 20			



**NHS GENERAL**

<b>Blood Gases</b>										
B	pH	PH		2		7.35 - 7.45	7.30 - 7.50		+/- 0.1	
B	pCO2	PCO2	kPa	1	Up to 2y	3.5 - 5.5				
					3y - 150y	4.5 - 6.1	3.5 - 8.0		+/- 1.0	
B	pO2		kPa	1		12.0 - 14.0	10 - 16		+/- 3.0	
B	Actual Bicarbonate	ABIC	mmol/l	0	<2y	16 - 24				
					2 - 150y	21 - 25				
B	Base Excess	BXS	mmol/l	0	4w	-10 - -2				
					2y	-7				
					>2y	-3 to +3				
B	Standard Bicarbonate	SBIC	mmol/l	0	<2y	20 - 26				
					>2y	21 - 25				
B	% O2 Saturation	SAT	%	0		96 - 97				
<b>Metabolites</b>										
P	Plasma Lactate	LACT	mmol/l	1		0.5 - 2.0				
B	Ammonia	AMM	umol/l	0	0 - 4w	40 - 90				
						M 15 - 50				
						F 10 - 40	0 - 100			
<b>Misc Blood</b>										
B	HbA1c	HBA1	mmol/mol	1				Non-diabetic range 20 - 42 (IFCC standardised)		01/10/2011

B	Blood Alcohol		mg/l	0		Comment				
B	Carboxyhaemoglobin	COHB	%	1		<5.0				
B	Methaemoglobin	METHB	%	1		<1.5				
	<b>CSF</b>									
C	CSF Appearance			A						
C	CSF Protein	CTP	g/l	1		<0.4	<1.0			
C	CSF Glucose	CGLU	mmol/l	1		2.2 - 4.4	1.0 - 10.0		+/- 0.3	
C	CSF Lactate	CLACT	mmol/l	1			0.5 - 5.0			
C	CSF Bilirubin	CBIL	Abs units			<0.007				
	<b>Faeces</b>									
F	Faecal Occult Blood			A						
F	F Reducing Substances			A						
F	Faecal Porphyrins			A						
	<b>Fluid</b>									
W	Fluid Volume		ml	0						
W	Fluid Protein	FTP	g/l	0						
W	Fluid Albumin	FALB	g/l	0						

**NHS GENERAL**

W	Fluid LDH	FLD	IU/l	0						
W	Fluid pH	FPH		2						
W	Fluid Amylase	FAMY	U/l	0						
W	Fluid Sodium		mmol/l	0						
W	Fluid Potassium		mmol/l	0						
W	Fluid Urea		mmol/l	1						
W	Fluid Creatinine		umol/l	0						
W	Fluid Osmolality		mmol/kg	0						
W	Fluid Lactate		mmol/l	1						
W	Fluid Bilirubin		umol/l	0						
W	Fluid Cholesterol		mmol/l	1						
W	Fluid Triglycerides		mmol/l	1						
W	Fluid Glucose		mmol/l	1						
W	Fluid CO2		mmol/l	0						
W	Fluid CA19-9		U/ml	0						
W	Fluid CEA		ug/l	0						
W	Fluid Iron		umol/l	1						

**NHS GENERAL**

W	Fluid AFP		ug/l	0					
	<b>Urine U&amp;E</b>								
U	Urine Volume		ml	0					
U	Urine Sodium		mmol/l	0					
U	24h Urine Sodium	UNA24	mmol/24h	0		40 - 250			
U	Urine Potassium		mmol/l	0					
U	24h Urine Potassium	UK24	mmol/24h	0		25 - 125			
U	Urine Urea		mmol/l	0					
U	24h Urine Urea	UU24	mmol/24h	0		250 - 600			
U	Urine Creatinine		mmol/l	1					
U	24h Urine Creatinine	UCR24	mmol/24h	1		M 9.0 - 17.7 F 7.0 - 15.9			
U	Urine Chloride		mmol/l	0					
U	24h Urine Chloride	UCL24	mmol/24h	0		40 - 250			
U	24h Creat Clearance	CRCL	ml/min	0	Adult Male Adult Female	90 - 125 85 - 120			
U	Urine Osmolality	UOSM	mmol/kg	0					
	<b>Misc Urine</b>								
U	Urine Albumin (Microalbumin)	UALB	mg/L				5.0 - 20		

**NHS GENERAL**

U	Urine Albumin/Creatinine ratio	ACR	mg/mmol Creat	1	>16y	0 - 3.0	0 - 3.0	+/- 10%
U	Urine Calcium		mmol/24h	1				
U	Urine Calcium/Creatinine ratio	UCACR	mmol/mmol creat	2	0 - 51w	0.09 - 2.20		
					1y	0.07 - 1.50		
					2y	0.06 - 1.40		
					3y - 4y	0.05 - 1.10		
					5y - 6y	0.04 - 0.80		
					7y - 17y	0.04 - 0.70		
					18y - 150y	<0.70		
U	24h Urine Calcium	UCA24	mmol/24h	1		2.5 - 7.5		
U	Urine Magnesium		mmol/l	1				
U	Urine Mg/Creat	UMGCR	mmol/mmol creat	1	51w	0.4 - 2.2		
					1y	0.4 - 1.7		
					2y	0.3 - 1.6		
					4y	0.3 - 1.3		
					6y	0.3 - 1.0		
					9y	0.3 - 0.9		
					13y	0.2 - 0.7		
					17y	0.2 - 0.6		
					>17y	0 - 0.6		
U	24h Urine Magnesium	UMG24	mmol/24h	1		1.0 - 7.0		

U	Urine Phosphate		mmol/l	1					
U	Urine Phosphate/Creatinine ratio	UPO4CR	mmol/mmol creat	1	26w - 51w	1.2 - 19.0			
					1y	1.2 - 14.0			
					2y	1.2 - 12.0			
					3y - 4y	1.2 - 8.0			
					5y - 6y	1.2 - 5.0			
					7y - 9y	1.2 - 3.6			
					10y - 13y	0.8 - 3.2			
					14y - 17y	0.8 - 2.7			
					18y - 150y	<2.9			
U	24h Urine Phosphate	UPO424	mmol/24h	1		15 - 50			
U	Urine Protein		mg/l	1					
U	Urine Protein/Creatinine ratio	UTPCR	mg/mmol creat	1	Up to 1y	0 - 56			
					2y - 150y	0 -20			
U	24h Urine Protein	UTP24	mg/24h	1		<150			
U	Urine Urate		mmol/l	1					
U	Urine Urate/Creatinine ratio	UURACR	mmol/mmol creat	1	7d	0.10 - 1.9			
					16w	0.30 - 1.7			
					1y	0.4 - 1.5			
					3y	0.5 - 1.3			
					4y	0.3 - 1.1			
					6y	0.3 - 0.8			
					9y	0.26 - 0.56			
					13y	0.2 - 0.44			
					17y	0.2 - 0.4			
					>17y	0.2 - 0.4			

**NHS GENERAL**

U	24h Urine Urate	UURA24	mmol/24h	1		0 - 6.0				
U	Urine pH			2						
U	Urine Hydroxy Indole Acetic Acid		umol/l	0						
U	HIAA/Creatinine ratio	UHIACR	umol/mmol creat	1		<4				
U	24h Urine HIAA	UHIACR	umol/24h	1		10.5 - 41.8				
U	Urobilin			A						
U	Urobilinogen			A						
U	Porphobilinogen			A						
U	Urinary Bilirubin			A						
U	Urinary Haemoglobin			A						
U	U Reducing Substances			A						
U	Urine Glucose									
U	Urine Alcohol		mg/l	0		Comment				
U	Urine Ketones			A						
U	Urine Amylase		U/l	0						

**NHS GENERAL**

U	Amylase/Creat ratio			1						
	<b>Sweat</b>									
SW	Sweat Sodium	SWNA	mmol/L	0						
SW	Sweat Chloride	SWCL	mmol/L	0		<40				
SW	Sweat Rate	SWRATE	ul/30 minutes	0		>15				