Pathology department test list

Below is an alphabetical list of tests available from all the laboratories, with short notes on their use.

The letter in brackets gives the sample type needed – see key.

Key to sample types

(S) = Serum sample
(P) = Lithium heparinised Plasma sample
(E) = EDTA sample
(C) = Citrate sample (note the sample volume is critical for coagulation tests)
(F) = Fluoride sample to inhibit metabolism of glucose.
(U) = Urine sample (no special preservative)
(Us) = Urine sample specific preservative needed.

A

Acetylcholine receptor antibody – ACRA (S) (Blood Sciences)
Present in 90% of patients with myasthenia gravis. Sent to reference laboratory; results usually available in 2 weeks.

ACTH (E) (Blood Sciences)
Like most polypeptide hormones is very labile and must be separated and frozen immediately. Please contact laboratory before taking sample.

Useful for locating the origin of proven adrenocortical dysfunction. Assay performed by reference laboratory; results usually available in 3 weeks.

Albumin (S) (Blood Sciences)
During illness albumin tends to move towards the extravascular compartment; the resulting lowered concentration of albumin is the most common change in plasma proteins in pathological states.

- Concentrations less than 30 g/L usually signify serious organic disease
- The lowest values (10-20 g/L) occur in nephrotic syndrome and protein losing enteropathy
- Concentrations below 20 g/L are generally accompanied by oedema
- Results available on day sample received

Alcohol (F) (Blood Sciences)
(Clinical not medico-legal) – an appropriately timed random alcohol is a useful test for alcohol abuse. Do not use an alcohol swab to clean the skin. Assay performed in-house, usually on day received.

**Aldosterone (EDTA plasma) (Blood Sciences)**
Aldosterone/renin ratio recommended on an outpatient basis for the diagnosis of Conn’s syndrome. Most antihypertensive treatments interfere with assays for aldosterone & renin. Samples must be separated and frozen immediately.

**Alkaline phosphatase Isoenzymes (S) (Blood Sciences)**
Used to distinguish between bone and liver origin of elevated alkaline phosphatase. However gamma glutamyl transferase (GGT) which is performed daily in the laboratory can usually give the same information more quickly since gamma GT is not present in bone. Turnaround time 30 days.

**Alpha 1 antitrypsin (S) (Blood Sciences)**
Deficiency (ZZ phenotype) may cause prolonged neonatal jaundice or liver disease or may present in adult life with emphysema. Since the alpha 1 band on electrophoresis is almost all due to alpha 1 antitrypsin, complete absence of the alpha 1 band is highly suggestive of the condition. Quantitation performed at reference laboratory, usually taking 10 days.

**Alpha foeto protein (AFP) (S) (Blood Sciences)**
Is found in high concentrations in foetal serum and in very low concentrations in normal adult serum (<10 Ku/L) but may range from normal to very high levels (>100,000 Ku/L) in the sera of patients with hepatocellular or yolk-sac derived (endodermal sinus) cancers.

Elevations up to 500 Ku/L frequently occur in association with a variety of non-malignant liver diseases, but levels above this are suggestive of an AFP producing tumour. However, as a result of improved imagery techniques we know that a significant number of tumours have a normal AFP at diagnosis.

In benign disease AFP elevation is either constant or transient. In pregnancy maternal serum levels may be used to assess the risk of neural tube defects and Downs syndrome (when combined with other markers). Assay performed daily.

**ALT (S) (Blood Sciences)**
Liver enzyme which is most sensitive to hepato cellular damage. Performed daily.

**Amino Acids (S and U) (Blood Sciences)**
Forms part of the metabolic screen in paediatric patients. Age, details of diet and/or iv. Therapy, drug therapy and any other feature of relevance are essential for the correct interpretation of results. These tests are performed at a reference laboratory and usually take 2 weeks.

**Ammonia (P) (Blood Sciences)**
Used in the diagnosis and monitoring of urea cycle disorders and Reyes syndrome. May be available out of hours if discussed with Dr. Quiney. Not useful in adult hepatic encephalopathy. Normally performed on day received. Please ’phone laboratory to arrange special collection bottle. Transport to laboratory on ice.

**Amylase (S) (Blood Sciences)**
Very high levels support the diagnosis of pancreatitis. However other conditions which present with abdominal pain may have very elevated levels:

1. afferent loop obstruction
2. absorption through the peritoneum as in biliary peritonitis
3. damage to the pancreas or its blood supply

Assay available 24 hrs/day.

**Angiotensin converting enzyme (ACE)(S) (Blood Sciences)**
Useful for monitoring the activity of sarcoidosis but not sensitive enough to be used in diagnosis. Performed at reference laboratory; usually results available in one week.

**Antenatal Screen (Blood Sciences/Microbiology)**
The purpose of these tests is to provide a blood group, exclude anaemia, red cell antibodies and haemoglobinopathies (see 61). Tests should be done according to the protocol in Box 6.

Please make the ethnic origins clear on non-Caucasians so we can test for thalassaemias and haemoglobinopathies as appropriate; we rely on this information since we apply selective screening in accordance with national guidelines. Do not assume microcytosis is due to iron deficiency in non-caucasians without checking a serum ferritin.

When testing partners please make it clear who they relate to. **NOTE:** once thalassaemias and haemoglobinopathies have been excluded for an individual they do not need repeating with each pregnancy unless partners change, neither do known ones. All Haematology booking bloods must be accompanied by a completed Family Origin Questionnaire (FOQ).

**Antenatal screening tests**
At booking:

- Chemistry - Glucose
- Micro – see microbiology antenatal screening section of the service user guide
- Haematology – FBC, Group & Antibody screen, sickle and Thalassaemia screen if appropriate (in accordance with national guidelines)

<table>
<thead>
<tr>
<th>Time</th>
<th>Rhesus Group</th>
<th>FBC</th>
<th>Antibody Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At 28-30 weeks:</strong></td>
<td>Rh Neg</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Rh Pos</td>
<td>Yes</td>
<td>Not required</td>
</tr>
<tr>
<td><strong>At 36 weeks:</strong></td>
<td>Rh Neg and Rh Pos</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Protocol will be followed in all cases unless

1. Anaemia is diagnosed
2. Antibodies are identified

In these cases, more frequent testing may be appropriate.
**Antibiotics assay (other than gentamicin) (S) (Microbiology)**
See the microbiology antibiotic assays section of the service user guide

**Anti-cardiolipin antibodies (S) (Immunology)**
Associated with an increased risk of arteriovenous thrombosis, recurrent foetal loss, and thrombocytopenia. Associated with a prolonged APTT and with the lupus anticoagulant

**Anti-dsDNA abs (S) (Immunology)**
Found in SLE and in low levels in other systemic CTD. Levels show some correlation with disease activity

**Anti-ENA (S) (Immunology)**
Anti SSA/SSB is associated with Sjogrens syndrome. SSA is found particularly in subacute cutaneous lupus but also in Sjogrens syndrome and SLE.

Anti-Sm is restricted to SLE when found alone, anti-RNP is found in 90% of those with MCTD. Anti-Scl-70 is detected in scleroderma and anti-Jo1 abs are detected in polymyositis associated with interstitial lung disease.

**Anti-endomysial abs (S) (Immunology)**
Found in >90% of patients with coeliac disease especially if IgA isotype. Also 35% of patients with Dermatitis Herpetiformis.

**Anti-Hu and Anti-Yo abs (Immunology)**
Antibodies against Hu are found in paraneoplastic encephalomyelitis & sensory neuropathy occurring in small cell lung cancer, abs against Yo are found in paraneoplastic cerebellar degeneration occurring in carcinoma of the ovary and breast.

**Anti-Liver kidney microsomal antibodies (S) (Immunology)**
These are found in some types of autoimmune hepatitis; and also may be present with chronic hepatitis C infection.

**Anti-mitochondrial antibodies (S) (Immunology)**
Found in >90% of those with PBC; low titre in some types of autoimmune hepatitis and occasionally in CREST.

**Anti-MPO and PR3 antibodies (S) (Immunology)**
Anti-MPO antibodies are associated with microscopic polyangiitis. Anti-PR3 antibodies are associated with Wegener’s Granulomatosis. Other small vessel vasculitides may have either auto antibody.

Occasionally anti-MPO or PR3 antibodies are present with a negative ANCA. If vasculitis is strongly suspected then contact the laboratory to request these tests even when the ANCA is negative.

**Anti-neutrophil cytoplasmic antibodies (ANCA) (S) (Immunology)**
ANCA may be perinuclear (P-ANCA) or cytoplasmic (C-ANCA). These are found in small vessel vasculitis but also may be associated with other systemic inflammatory conditions or chronic infections. Antibodies to myeloperoxidase (MPO) and proteinase 3 (PR3) are used to determine the disease – specificities of the ANCA.
Anti-nuclear abs (S) (Immunology)
At high titre levels are highly suggestive of a systemic connective tissue disorder; but low levels are frequently found in old age and with any cause of chronic inflammation.

Anti-parietal cell abs (S) (Immunology)
Detected in pernicious anaemia and some types of autoimmune gastritis.

Anti-PDH (M2) Antibodies (S) (Immunology)
These are associated with Primary Biliary Cirrhosis. These tests are occasionally undertaken to confirm that the anti-mitochondrial antibodies are those that are found in PBC.

Anti-smooth muscle antibodies (S) (Immunology)
Found in autoimmune hepatitis and in low titres in viral hepatitis; but are frequently non-specific.

Anti-Thyroid microsomal antibody (S) (Immunology)
Detected in >90% of those with clinical significant autoimmune thyroiditis.

Anti-Thyroid Receptor Ab’s (S) (Immunology)
Found in Graves disease; check especially in pregnant women with Graves disease.

Anti-Tissue transglutanimase(S) (Immunology)
Found in >90% of patients with Coeliac Disease. See also Anti-endomysial abs.

APTT or APTR (C) (Blood Sciences)
Activated partial thromboplastin time (or ratio) measures contact factors. Sensitive to factors XII, XI, IX, VIII and X. Abnormal with therapeutic heparin therapy (APTR therapeutic range 1.5-2.5). A normal test does not exclude mild Haemophilia A or B.

Aspartate transaminase (S) (Blood Sciences)
Forms part of liver and cardiac enzyme screen. Levels rise slightly later (6-8 hrs.) after MI than CK, peak at 24-48 hrs and remain elevated for 4-6 days. Performed daily.

Autoimmune profile (S) (Immunology)
This combined test will detect auto antibodies to gastric parietal cells, mitochondria, smooth muscle and liver-kidney microsomes.

B12 and Serum folate (S+E) (Blood Sciences)
Used to help diagnose the cause of anaemia or neuropathy, to evaluate nutritional status in some patients, to monitor effectiveness of treatment for B12 or folate deficiency.

These test requests may be vetted before analysis. We regard routine performance of these tests as part of a ‘Dementia Screen’ as of unproved clinical utility in patients with normal haematology.
Bence-Jones Protein (U) (Blood Sciences)
A fresh random sample; without preservative; is all that is needed. Note that urine "stick" tests for protein may not detect Bence-Jones protein. "Bence-Jones" only myelomas account for approx. 20% of all myelomas and have no abnormal serum band. Assays run weekly.

Beta2 microglobulin (S) (Blood Sciences)
Used as an independent prognostic indicator in Multiple Myeloma. Inevitably raised (and therefore not useful) in renal failure. At the request of the Haematology consultant only.

Bicarbonate (S) (Blood Sciences)
Performed as a routine on all urea and electrolyte specimens; available 24 hrs/day.

Bilirubin (S) (Blood Sciences)
Total bilirubin forms part of routine liver screen. Separate measurement of conjugated and unconjugated bilirubin routinely available. Performed daily.

Blood Cultures (Microbiology)
See the microbiology guidelines on blood cultures in the service user guide

Blood gases (Heparinised arterial samples) (Blood Sciences)
Performed on blood gas analyser, available in ITU, SCBU and A&E. Contact laboratory if any difficulty experienced with the machines, which are maintained by Clinical Chemistry staff.

PLEASE make sure that inadequately heparinised specimens are not used. Clots in the machine are the commonest cause of its failure. PLEASE USE PICO 50 & PICO 70 BLOOD GAS SYRINGES ONLY

Bone marrow (Blood Sciences)
Requests for bone marrow examinations form part of a clinical haematological referral to one of the consultants. Please ensure, if possible, before the request is made that a FBC and film is marked with the clinical details and "Consultant film; for marrow?"

C

C1 esterase inhibitor (S or P) (Blood Sciences)
Used for the diagnosis of angioneurotic oedema. Sample sent to reference laboratory for both functional and immunological measure of inhibitor. Results normally available in 2-3 weeks.

CA19-9 (S) (Blood Sciences)
CA19-9 is neither a tumour-specific nor organ-specified antigen. Its main diagnostic relevance is in the diagnosis, monitoring and detection of recurrence of patients with pancreatic, hepato-biliary and gastric cancer.

CA125 (S) (Blood Sciences)
This is a tumour marker for ovarian carcinoma. Moderate elevations may be seen in non-malignant conditions, e.g. pregnancy, menstruation, endometriosis, ascites, cirrhosis, renal failure, acute pancreatitis, peritonitis and in other inflammatory pelvic diseases.
High concentrations are more likely to be associated with malignancy. 98% of post-menopausal and 49% of pre-menopausal women with a concentration >70ku/L have malignant disease.

CA125 >30ku/L are seen in 50% of patients with Stage 1 ovarian carcinoma and over 90% in Stage 2, 3 or 4 disease. Increased CA125 also occurs in patients with non-ovarian malignancy; other gynaecological cancer, 50% of all intra-abdominal cancers and in advanced lung and breast cancer.

C-Reactive Protein, CRP (S) (Blood Sciences)
A sensitive acute phase protein. In inflammatory bowel disease CRP correlates with relapse, remission and response to therapy. In rheumatology CRP levels correlate with disease activity in rheumatoid arthritis, polyarteritis nodosa, giant cell arteritis and polymyalgia rheumatica. In infectious disease CRP is elevated in bacterial, fungal and parasitic disease. Viral infection may also elevate CRP but not to the same degree as with bacteria. Assay performed daily.

Caeruloplasmin (S) (Blood Sciences)
With copper used to screen for Wilson’s disease. Sample sent to reference lab. Results normally available in 2 weeks.

Calcitonin (S) (Blood Sciences)
Like PTH; a labile hormone which must be brought to the laboratory as soon as it has been taken for separation and freezing. Used as a tumour marker in medullary carcinoma of the thyroid. Samples sent to reference laboratory and normally take 2-3 weeks.

Carbamazepine (S) (Blood Sciences)
Therapeutic level considered to be 6-12 mg/L (Blood taken immediately before next dose). Timing not important for sustained release preparations. Assays normally performed twice weekly. Urgent requests to be discussed with Dr. Quiney.

Carboxyhaemoglobin – CoHb (E) (Blood Sciences)
Toxic levels seen after attempted suicide or smoke inhalation. Levels up to 10% are seen in smokers. Available 24 hrs/day on the Blood Gas Analysers in A&E / ITU only.

Carcino Embryonic Antigen (CEA) (S) (Blood Sciences)
Has been widely used to aid cancer diagnosis, but because CEA may be elevated in a number of non-malignant conditions; elevations must be considered suggestive, but not diagnostic, of cancer. CEA has been most useful for monitoring therapeutic efficacy in patients with adenocarcinoma. High levels are highly suggestive of colorectal cancer. Assays performed in house. Results available daily.

Catecholamines (Us) (Blood Sciences)
24 hour urine for urinary fractionated metanephrines is now the first screen for phaeochromocytoma. It has a sensitivity of approximately 97%. Collection bottle may be obtained from clinical chemistry. Samples sent to reference lab. Turnaround time 2 weeks (approx).

Chloride (S) (Blood Sciences)
Measurement of chloride may give additional information in acid-base disorders. Available 24 hrs/day.
**Cholesterol (S) (Blood Sciences)**
Important predictor of IHD. Levels fall with acute illness and should be measured 2-3 months after major illness. In acute MI values obtained in the first 12 hours are reliable. Results available daily.

**Cholinesterase (S) (Blood Sciences)**
Cholinesterase is measured to detect increased sensitivity to succinylcholine and to confirm acute organophosphate poisoning. Genotyping of patients sensitive to succinylcholine is carried out at a national reference laboratory and takes approx. one month.

**CMV Culture (Microbiology)**
View the Information on CMV in the Microbiology section

**Coeliac screen (S) (Immunology)**
In the first instance serum will be tested for IgA tissue transglutaminase antibodies. Follow up testing for endomysial antibodies and serum IgA levels may be performed. Patients must be on a gluten containing diet if the test is being performed for the diagnosis of coeliac disease.

**Combined pituitary function test (Blood Sciences)**
By arrangement with Dr. Quiney Ext. 3573.

**Complement C3 and C4 (S or E) (Blood Sciences)**
Tests performed at reference laboratory. Results normally available within 2-3 weeks.

**Complement**
The most abundant component of complement in the circulation is C3. Measurement of C3 alone is probably sufficient for detecting hypocomplementaemia.

C4 usually parallels C3 but many people have naturally low levels of C4 because of the C4 null gene.

CH50 measurement is inherently variable, is cumbersome to perform and is rarely performed.

**Copper (S) (Blood Sciences)**
With caeruloplasmin; used in the diagnosis of Wilson’s disease. Sample sent to reference laboratory. Results normally available in 2 weeks.

**Cortisol (S) (Blood Sciences)**
Assays performed daily. If result needed urgently; please warn laboratory before 3pm (not normally available out-of-hours - please consult Dr Quiney).

Random cortisols are not generally useful to exclude Cushing’s or Addison’s.

For exclusion of Cushing’s disease as an outpatient the 1 mg. overnight Dexamethasone test is probably the simplest test.

For exclusion of Addison’s see Synacthen test, p67.
Creatinine (S) (Blood Sciences)
Serum level has an inverse exponential correlation with GFR. Levels may be in the normal range when GFR has halved. Assays performed daily.

Creatinine & Electrolytes (S or U) (Blood Sciences)
This will include Creatinine, Urea, Sodium, Potassium & Bicarbonate. Levels performed daily. Available 24hr/day.

Creatine Kinase (S) (Blood Sciences)
Levels may be normal in the first 4-6 hours following infarction. Peak levels seen at 24-48 hours post infarct. Performed daily.

Cryoglobulins (S) (Blood Sciences)
Sample must be taken into warm tubes and kept at 37ºC while clotting. Please contact Chemistry laboratory (Ext. 3591) for instructions.

CSF Samples (Blood Sciences) (Microbiology) (Cytology)
Indication: sub-arachnoid or meningitis. See microbiology CSF information in service user guide.

CSF (Blood Sciences)
CSF glucose and protein are routinely available both within normal hours and on call.

CSF xanthochromia can be used to determine the need for angiography in those few patients who are CT-negative in whom the clinical suspicion of a SAH remains high. It may remain positive for 2 weeks after the event. The LP should only be performed >12 hours after the onset of presenting symptoms.

Other CSF investigations e.g. oligoclonal bands are sent to a reference laboratory and normally take 2-3 weeks.

CSF (Cytology)
- Sterile bijoux bottles (1-2 mL/bottle).
- Bottles 1 to Haematology or Cytology for a cytospin.
- Bottle 2 to Clinical Chemistry for protein.
- Bottle 3 to Microbiology for a cell count and culture.

Cytogenetics (Blood Sciences)
See information on cytogenetics in the blood transfusion section of the service user guide.

D

D-dimer assay (C) (Blood Sciences)
A negative D-dimer assay is useful in the exclusion of DVT in low risk patients and may be used to aid diagnosis of PE in some cases. It must be used in conjunction with a clinical scoring system.

A positive result has no significance. All D-dimer requests for patients with a possible PE must be accompanied by a copy of the clinical score sheet.
Deoxypyridinoline (U) (Blood Sciences)
Performed at a Reference Laboratory. Results in 3 weeks

D.I.C. screen (E, C) (Blood Sciences)
This should be performed when there is strong clinical suspicion of DIC and abnormal bleeding, and especially when potentially catastrophic pregnancy complications occur. Note samples from arterial lines and central lines are not suitable if they have been heparinised at any stage.

The full screen comprises an PT, APTT, fibrinogen, platelets and examination of the blood film. DIC can be diagnosed when a low/falling platelet count and fibrinogen occur in the correct clinical setting.

Digoxin (S) (Blood Sciences)
Test performed in-house daily. Therapeutic range 0.8-2.0 ug/L. Sample must be at least 6 hrs. after oral dose. Sample may be processed urgently. Please discuss with Dr. Quiney. Digoxin like immunoreactive factors may be found in neonates, pregnancy, renal and liver disease causing falsely elevated results.

Drugs of Abuse Screen (U) (Blood Sciences)
Urine may be screened for Amphetamine; Barbiturate; Benzodiazepine; Cocaine; Methadone, Morphine, Codeine, Dihydrocodeine, at reference laboratory. Results normally available within two weeks.

Electrolytes (S) (Blood Sciences)
Routinely available at any time. Comprises Sodium potassium; bicarbonate; creatinine and urea.

Erythrocyte Sedimentation Rate (ESR) (Citrate for ESR) (Blood Sciences)
Used to determine and monitor the activity of inflammation. Especially important in temporal arteritis.


Factor Assay (C) (Blood Sciences)
Measurement of specific coagulation factor(s) in the investigation of suspected clotting disorders. Performed only following discussion with Haematology consultant(s).

Faecal elastase (Blood Sciences)
Elastase is a pancreatic enzyme that is not cleaved during its passage through the bowel. In the presence of exocrine pancreatic insufficiency or disorders of exocrine pancreatic function, the elastase secretion is reduced; thus resulting in a decrease of the faecal concentration of this enzyme.
Sample – fresh sample of faeces. Sent to reference lab. Turnaround about 2 weeks

Faecal fat
Discontinued assay

Faeces (Microbiology)
See the microbiology section of the service user guide

Faecal occult blood (Blood Sciences)
Modern methods are less sensitive to dietary intake. Three samples are recommended. Card collection system now in use.

Ferritin (S) (Blood Sciences)
Indicator of body storage iron. May be elevated by inflammatory disorders, malignancy and liver disease. Used to help diagnose the cause of anaemia

Fibrinogen (C) (Blood Sciences)
Soluble plasma protein that is converted; by the action of thrombin; to fibrin; thus leading to blood clotting. Test appropriate for certain patient groups only e.g. DIC, ITU patients, liver failure, jaundice, PET etc.

Follicle Stimulating Hormone FSH (S) (Blood Sciences)
Performed daily

Normal range for female hormones:

<table>
<thead>
<tr>
<th></th>
<th>LH (iu/L)</th>
<th>FSH (iu/L)</th>
<th>Oestradiol (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follicular phase</td>
<td>2 – 11</td>
<td>3 – 13</td>
<td>0.1 – 0.4</td>
</tr>
<tr>
<td>Mid-cycle</td>
<td>19 – 103</td>
<td>4 – 24</td>
<td>0.2 – 1.9</td>
</tr>
<tr>
<td>Luteal phase</td>
<td>1 – 12</td>
<td>2 – 9</td>
<td>0.3 – 1.0</td>
</tr>
<tr>
<td>Post-menopausal</td>
<td>10 – 58</td>
<td>16 – 113</td>
<td>0 – 0.3</td>
</tr>
</tbody>
</table>

Full Blood Count (E) (Blood Sciences)
Multiple analyses available from the automated counters including Haemoglobin; White cell count; Platelet count; Red Cell count & Mean Cell Volume. Blood films are examined depending on the results and clinical indications.

G

G6PD Deficiency (E) (Blood Sciences)
Is a sex-linked hereditary disorder. The condition, therefore is more common in males. There are two common variants: the Mediterranean type which has a very low activity and the A-type found in the Negro. The majority of subjects who have demonstrated this defect are clinically normal until exposed to oxidant drugs or infections. It can also be the cause of neonatal jaundice.
Testing should be considered whenever an otherwise unexplained case of haemolytic anaemia is encountered, or prior to prescription of oxidant drugs in particularly susceptible ethnic groups. Please also see “G6PD Deficiency” in the BNF. An EDTA blood sample is required and the enzyme is stable for 12 hours at room temperature. The test is not available “on call”.

**Gamma G.T. (S) (Chemistry)**
Routinely available. Of greatest use in the diagnosis and differential diagnosis of hepatobiliary diseases; in patients with developing cholestasis, the serum GGT increases before hyperbilirubinaemia. Further, a normal GGT is rare in cholestasis. Chronic alcoholism can produce persistently increased GGT activities.

**Gastrin (E) (Blood Sciences)**
Fasting sample has to be taken into KEDTA container and brought to laboratory immediately. Please contact the laboratory (Ext. 3573) for further details. Reference laboratory results normally available within 10 days.

**Gentamicin (S) (Blood Sciences)**
By arrangement with Chemistry. (See The Guidelines For The Management Of Common Medical Emergencies And For The Use Of Antimicrobial Drugs “The Grey Book”).

**Glucose (F) (Blood Sciences)**
Routinely available at all times. Glucose tolerance test (full or modified) and glucose load tests may be arranged by telephoning Dr. Quiney’s secretary ext. 3596.

See the chemical pathology section of the service user guide for more information

**Growth hormone (S) (Blood Sciences)**
Random levels rarely useful, but see IGF-1 for screening for acromegaly. Protocols for testing for acromegaly and growth hormone deficiency are available from the laboratory. Contact Dr Quiney Ext. 3573.

**Haemochromatosis (S) (Blood Sciences)**
A serum ferritin (S) is usually sufficient to exclude haemochromatosis. If the ferritin is equivocal or there is a strong family history, the % transferrin saturation will be performed on the same sample, in accordance with national guidelines. The genetic defect in the HFE gene can now be detected to confirm the diagnosis (3 x EDTA samples).

**Haemoglobin Electrophoresis (E) (Blood Sciences)**
Useful in investigation of Thalassaemia and Haemoglobinopathies; see Box 9. A request should always be accompanied by a FBC. A normal result may be used to exclude either Sickle Cell anaemia or Sickle Cell trait. Must be requested at booking on all antenatal patients of non-Caucasian origin. Please state the ethnic origin.

Please note a completed Family Origin Questionnaire (FOQ) must accompany all booking bloods.
Notes on Haemoglobinopathies

Haemoglobinopathies have a much higher incidence in patients of non-Caucasian origin. There are important implications of an abnormal result in people of childbearing age. Partners should be tested making the family relationships clear to us. Genetic counselling and antenatal diagnosis can be offered through the Haematology department.

In people with thalassaemia; microcytosis does not indicate iron deficiency and the serum ferritin should be used to assess this. These disorders are hereditary so they do not need to be repeated with each pregnancy; if the partner is the same; once a valid result is recorded in the notes.

Haemoglobin A1c (E) (Blood Sciences)
Reflects diabetic control over the previous 4-6 weeks. Tests performed daily.

HDL Cholesterol (S) (Blood Sciences)
An important negative risk factor for IHD. Samples are analysed daily.

Hepatitis Serology (S) (Microbiology)
See the microbiology section of the service user guide

HIAA (Us) (Blood Sciences)
Hydroxyindoleacetic acid is excreted in excess in the urine of patients with the carcinoid syndrome. The 24 hr. urine should be collected into a container containing acid preservative. These may be obtained from the Chemistry laboratory. Assays performed in reference laboratory. Results usually available within 10 days.

Hormone profile (Us) (Blood Sciences)
A 24 hr. urine profile for Androsterone; Aetiocholanolone; DHA; 11-hydroxyandrogens; cortisol metabolites, THF/alloTHF ratio, pregnanetriol, THS. Pregnanetriol is available at a reference laboratory. These profiles may give additional information in certain cases of suspected Cushing’s and in some cases of hirsutism.

An appropriate container for the 24 hr. save may be obtained from the Chemistry laboratory. Performed in reference laboratory. Results usually available within 2 weeks.

Hormone Profile (S) (Blood Sciences)
Refer to individual assays.

Human Chorionic Gonadotrophic hormone (S) (Blood Sciences)
The level of beta HCG is elevated in all choriocarcinomas and some (10-30%) seminomas and pregnancy. Samples analysed daily.

Hydroxyproline: Creatinine ratio (U)
Discontinued assay. Refer to deoxypyridinoline assay as this is more specific to bone
IGF-1 (S) (Somatomedin C) (Blood Sciences)
Has been found to be a more reliable parameter for the diagnosis of acromegaly than a single GH determination, and in essence reflects integrated GH secretion over the previous day. Performed at reference laboratory. Results usually available within 10 days.

IgG Subclasses (S) (Blood Sciences)
Most patients with an IgG subclass deficiency suffer from frequent infections of the upper and lower airways. IgG subclass deficiency may occur as an isolated defect or with other immune deficiencies. Samples sent to reference laboratory.

Immunoglobulins (S) (Blood Sciences)
Routinely performed weekly. Please discuss with chemistry laboratory if needed more urgently.

Infectious Mononucleosis (Glandular fever) screen (S preferably; and E) (Blood Sciences)
In cases where glandular fever is likely from the clinical picture we will perform a FBC and film to assess the presence of ‘atypical lymphocytes’. The serum is used to perform a screening test to detect infectious mononucleosis heterophile antibodies.

As with all diagnostic tests, the results should be interpreted in light of the clinical symptom. Occasionally detectable levels of heterophile antibodies are late in developing in patients symptomatic for IM. Sero-negative IM has been reported.

In acute cases with a strong clinical picture and a negative IM test; we recommend a repeat in two weeks. Other causes of a clinically similar illness are CMV, Toxoplasmosis and HIV. Specific tests for these and for EBV serology are available from Microbiology.

INR (C) (Blood Sciences)
Used to measure the effect of warfarin on the coagulation factors. The International Normalised Ratio enables the effect of different thromboplastin reagents to be nullified and thus provides a result comparable from one laboratory to another.

Insulin (S) (Blood Sciences)
Like other polypeptide hormones insulin is labile. Once taken the sample must be brought immediately to the Chemistry Laboratory to be separated and frozen. This must be accompanied by a glucose sample. Sample sent to reference laboratory. Results normally available in two weeks.

Intrinsic Factor Ab’s (S) (Immunology)
Found in Pernicious anaemia; check especially with parietal cell abs + low B12 levels

Iron (S) (Blood Sciences)
Not routinely measured but levels can be measured in suspected overdose. Ferritin is a better measure of iron stores. Serum Iron and unbound iron binding saturation can also be of use in the evaluation of suspected Haemochromatosis.
**K**

*Ketones (F or U) (Blood Sciences)*  
Qualitative analysis only. Available at any time.

*Kleihauer Test (maternal E) (Blood Transfusion)*  
Performed on Rhesus D Negative women to exclude a foetal leak larger than 4 mL of packed cells.

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**L**

*Lactate (F) (Blood Sciences)*  
Useful in the differential diagnosis of metabolic acidosis. Available on the Blood Gas Machines in A&E and ITU. Samples sent to chemistry MUST be on ice.

*Laxative Screen (U) (Blood Sciences)*  
Contact Chemistry laboratory for details

*Lead (E) (Blood Sciences)*  
Chronic lead exposure may be assessed by measuring blood lead levels. Sample sent to reference laboratory. Results normally available within one week.

*Lipids (Blood Sciences)*  
See individual tests: cholesterol, HDL cholesterol & triglycerides

*Lithium (S) (Blood Sciences)*  
Sample should be taken 12 hrs. after last dose. Available on call in suspected overdose.

*Liver Function Tests (S) (Blood Sciences)*  
This will include Bilirubin; AST; Alkaline Phosphatase; Total protein; Albumin; globulins. Available daily.

*Luteinizing Hormone Releasing Hormone (GnRH) test (S) (Blood Sciences)*  
For in-patients please obtain protocol from Dr. Quiney. For out-patients please arrange with Dr. Quiney.

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**M**

*Magnesium (S) (Blood Sciences)*  
Routinely performed daily.

*Malarial Parasites (E) (Blood Sciences)*  
In cases of suspected malarial and tropical diseases indicate the presence of fever together with details of any recent travel and state countries visited and when. It is also helpful to provide details of any prophylaxis given to the patient.
Please note, despite thick and thin films being examined this does not exclude malaria completely and the request should be repeated if the clinical suspicion remains high. All positive results are phoned. See Also G6PD Deficiency

**Mercury (U or E) (Blood Sciences)**
For suspected exposure to elemental mercury or to inorganic mercury salts; determination of urinary mercury output is the estimation of choice. An early morning urine sample is appropriate in the first instance. In cases of exposure to organic mercury derivatives; measurement of blood mercury is preferred. Reference laboratory turnaround 2 weeks.

**Metanephrines (U) (Blood Sciences)**
The preferred biochemical screening test for phaeochromocytoma is fractionated metanephrines (Journal of Clinical Pathology 2010;63:669–674)

The sample required is a 24 hour collection of urine collected into a container with acid preservative (available from the Clinical Chemistry Dept). A sample is then sent to a Reference Laboratory.

Turnaround time for results is 2-3 weeks

**Microalbumin (U) (Blood Sciences)**
Used for the detection and monitoring of early diabetic nephropathy. Initial screen is performed on an early morning urine.

**Mycology (Microscopy and culture) (Microbiology)**
See the microbiology section of the service user guide

**O**

**Oestradiol (17 beta) (S) (Blood Sciences)**
Routinely available (see table under Follicle Stimulating Hormone

**Organ Specific Ab’s (S) (Immunology)**
Worth checking adrenal ab’s in Addisons disease, islet cell ab’s in newly diagnosed DM, ovary in premature ovarian failure and all of them in someone with two other ab’s e.g. thyroid, ANA, parietal cell especially if <20 yrs age or with vitiligo i.e. consider autoimmune polyglandular syndrome

**Osmolality (S or U) (Blood Sciences)**
Routinely available. Available out of hours if needed. **DO NOT USE BORIC ACID CONTAINERS; WHICH GIVE AN OSMO >500 ON THEIR OWN!!**

**Oxalate (U) (Blood Sciences)**
Routinely measured as part of renal stone work-up. Please contact Dr. Quiney for details of renal stone investigations.
Pancreolauryl test
No longer available due to discontinuation of kit by manufacturer.

Paracetamol (S) (Blood Sciences)
Available 24 hr/day. Toxic levels after 4 hours are assessed against the Rumac-Matthew nomogram (this is given in *the Guidelines For The Management Of Common Medical Emergencies And For The Use Of Antimicrobial Drugs “The Grey Book”* or from Clinical Chemistry). Toxic dose is 7.5 g for adults; 140 mg/Kg children.

Parathyroid Hormone (P) EDTA plasma (Blood Sciences)
Intact parathyroid hormone is measured in house. The new intact hormone assays give much better discrimination between primary hyperparathyroidism and other causes of hyperparathyroidism.

PTH, like other polypeptide samples, is labile and the sample, once taken, should be brought straight to the Chemistry Laboratory. Routinely performed twice a week. Please discuss with Dr. Quiney (ext. 3573).

Paternity testing (special tubes supplied in the department)
The Consultant Haematologists can arrange for the witnessing of samples. The paternity tests are carried out elsewhere. All such referrals must be arranged through a solicitor and arrangements made to pay by cheque on the day.

Phenobarbitone (S)(Blood Sciences)
Routinely available. Normally assayed twice per week at Worthing. If results needed on the same day please discuss with the Clinical Chemistry. Therapeutic range 10-30 mg/L. Because of the long half life for elimination, timing of sampling in relation to dose is not important.

Phenytoin (S) (Blood Sciences)
Routinely measured daily. After repeated oral doses; peak levels will generally reach a plateau in 6 to 10 days. Therefore timing of sample in relation to dose is unimportant. Therapeutic range 10-20 mg/L. Toxicity rarely seen at levels less than 15 mg/L, and not usually below 25 mg/L. Clinical signs of toxicity include nystagmus, ataxia, slurred speech, drowsiness, verbal unresponsiveness and seizures. Asystole and bradycardia have been reported.

Phosphate (S) (Blood Sciences)
Routinely measured every day.

Porphobilinogen (PBG) (U) (Blood Sciences)
is available at all times; and is always raised during an acute attack of one of the acute hepatic porphyrins. To screen for the hepatic porphyria out of the acute phase; or cutaneous porphyria, samples of blood, stool and a 24 hr. urine are required. These must be protected from light. Please contact Clinical Chemistry for further details.

Porphyrins (U) (Blood Sciences)
To exclude an acute attack of one of the acute hepatic porphyrins, a fresh random urine for porphobilinogen (PBG) is required.
Potassium (S) (Blood Sciences)
Available at all times.

Pregnancy test (U) (Blood Sciences)
Routinely available on demand to the public, positive within a few days of a missed period. The test is available via the Pathology Laboratory Specimen Reception, on a urine sample. Price at time of publication is £5.00. Cash or cheque made payable to ‘St. Richard’s Hospital’. Pregnancy kits for hospital wards should be requested from Pharmacy.

Primidone (S) (Blood Sciences)
Metabolite Phenobarbitone; sent away to reference laboratory. Therapeutic range 5-15 mg/L.

Progesterone (S) (Blood Sciences)
Progesterone measurements are used to document ovulation or adequacy of the luteal phase in infertile women. Serum progesterone is usually less than 3 nmol/L during the follicular phase. Coincident with LH rise, serum progesterone begins to rise and reach a peak greater than 30 nmol/L about 8 days after the LH peak. A progesterone greater than 16 nmol/L is considered to be consistent with ovulatory cycles by most investigators.

Progesterone 17-OH (S) (Blood Sciences)
The plasma level of this steroid is elevated in the commonest form of congenital adrenal hyperplasia, the 21 hydroxylase deficiency. Elevated in normal women in the luteal phase of menstrual cycle. Adult onset cases may have normal basal 17-OH progesterone and measurement of 17-OH progesterone after stimulation with synacthen may be needed. Please contact Dr. Quiney to arrange this test. Reference laboratory turnaround 10 days.

Prolactin (S) (Blood Sciences)
Women with hyperprolactinaemia can present with disorders of ovulation; galactorrhoea; delayed puberty or symptoms of mixed endocrinopathy. In men hyperprolactinaemia occasionally leads to infertility alone; but more commonly also causes impotence and low testosterone levels. Stress, hypothyroidism, seizures and psychotropic drugs all cause elevation of plasma levels of prolactin. Routinely performed daily (Mon-Fri).

Prostate specific antigen (S) (Blood Sciences)
Has replaced prostatic acid phosphatase for the detection of prostatic carcinoma. Assays routinely performed daily (Mon-Fri).

Protein (S or U) (Blood Sciences)
Serum total protein forms part of the liver function test profile. Routinely performed every day. Urine protein – 24hour and random – performed at least twice a week.

Prothrombin Time (C) (Blood Sciences)
Similar test to the INR but used for patients not taking Warfarin, sensitive to deficiencies of Factors VII, X, II. Useful test of liver synthetic function.

Pseudocholinesterase (S) (Blood Sciences)
Pseudocholinesterase (serum cholinesterase) is measured to confirm acute organophosphate poisoning.
RAST (S) (Blood Sciences)
Allergen specific IgE. Screening is available at reference laboratory. Please provide details of suspected allergens to enable appropriate testing.

Reducing substances (U) (Faeces)
This is a discontinued assay.

Renin (E) (Blood Sciences)
See aldosterone

Reticulocytes (E) (Blood Sciences)
Performed on request as part of full blood count. Quantification of young erythrocytes; newly released from the bone marrow.

Rheumatoid Factor (S) (Immunology)
Elevated in 60-70% of patients with Rheumatoid arthritis but maybe elevated in chronic infection and other systemic inflammatory conditions.

Salicylate (S) (Blood Sciences)
Routinely available 24 hrs/day. 6 hr. blood levels may be compared with the Done nomogram.

Sickle Test (E) (Blood Sciences)
A negative result is used to exclude sickle cell anaemia or sickle cell trait (but does not distinguish between these). In the non-emergency situation Haemoglobin Electrophoresis is a preferable and more informative test. A normal FBC excludes sickle cell anaemia. If a negative result has been obtained previously, it does not need repeating.

Note: a negative sickle cell test does not exclude sickle haemoglobin in the neonatal period when electrophoresis is required. It is recommended that infants are not tested prior to 6 months of age.

Skin antibodies (Immunology)
Helpful in diagnosis of blistering skin disease e.g. pemphigus; bullous pemphigoid (Skin biopsy)

Sodium (S and U) (Blood Sciences)
Serum levels routinely available 24 hrs/day. Urine daily (Mon-Fri) and by arrangement outside normal hours.

Sweat test (Blood Sciences)
Used for the diagnosis of cystic fibrosis. Test performed in the laboratory. Arrange with laboratory staff (ext. 3591)
**Synacthen Test (Blood Sciences)**
The short synacthen test involves the intra muscular injection of tetracosactrin and timed blood samples to assess cortisol response. Performed in the laboratory on out-patients by prior arrangement with Dr. Quiney. For inpatients please contact Dr. Quiney for protocol.

**Testosterone (S) (Blood Sciences)**
Performed at reference laboratory; results usually available in one week. Sex hormone binding globulin (SHBG) may be useful to give a guide to the free testosterone level in women. This is usually expressed as the free androgen index (FAI).

**Theophylline (S) (Blood Sciences)**
Theophylline is poorly soluble in water but solubility is increased in pharmacological preparations by combination with ethylenediamine to form aminophylline. In dissolution in biological fluids this yields true theophylline which is measured in a serum sample.

The therapeutic range is considered to be 10-20 mg/L. Toxic effects are rarely seen below 15 mg/L but occur often at concentrations above 25 mg/L. In patients younger than 30 days the therapeutic range is 5-12 mg/L. Blood samples for monitoring should be drawn at the time of peak concentration, usually 2-4 hrs. after a dose depending on product formulation. These assays are performed daily.

**Thrombin Time (C) (Blood Sciences)**
Useful test of fibrinogen quantity and quality. Abnormal with therapeutic doses of heparin. Prolonged by presence of FDPs and dysfibrinogenaemia.

**Thrombophilia screens (C) (Blood Sciences)**
The current screen includes Antithrombin III, Protein C, Free Protein S, Activated Protein C Resistance (APCR), Lupus Anticoagulant and Anticardiolipin antibodies. Genetic testing for Factor V Leiden (FVL) and PT gene (prothrombin gene mutation) will be organised if appropriate. Full blood count and film. **NOTE there are strict guidelines on who should be investigated issued by the British Society for Haematology.**

Thrombophilia screens are performed on patients with venous thrombo-embolism aged less than 45, usually after the patient has stopped warfarin. In particular circumstances; a partial screen may be performed while the patient is still on Warfarin. All requests are vetted by the Haematology consultants, and all results interpreted by them in the light of the clinical data. The majority of patients should be managed according to their own personal history and not by results of thrombophilic screens. **Screens are rarely performed on patients over 50 years, as they do not effect the management.**

BSH guidelines on the investigation of thrombophilia:

- Personal and family history of venous thrombo-embolism particularly if < 45 years and recurrent.
- Thromboses at unusual sites; especially if spontaneous.
- Skin necrosis on coumarins.
- Arterial thrombosis < 30 years old.
• Unexplained prolongation of the APTT (lupus anticoagulant).
• Recurrent foetal loss and early pre-eclampsia
• ITP, SLE or clinical features of antiphospholipid syndrome.

**Thyroid function tests (S) (Blood Sciences)**
TSH is measured first – if abnormal Free T4 and/or Free T3 is then performed. For patients on treatment, Free T4 is assayed as well. Assayed daily (Mon-Fri).

**Thyrotropin Releasing Hormone Test (S) (Chemistry)**
TRH testing is still occasionally useful in cases of equivocal hyperthyroidism. Please contact the Chemistry Laboratory for details. On outpatients Dr. Quiney will perform the test if arranged previously with him or his secretary.

**Tissue typing (E) (Blood Transfusion)**
Would be unrelated bone marrow donors are recommended to contact the Anthony Nolan panel. Full tissue typing is normally only performed prior to organ donation via the consultant Haematologists. HLA-B27 typing 10 mL EDTA.

**Total protein (S) (Blood Sciences)**
Routinely performed every day as part of the liver function tests.

**Troponin I (S) (Blood Sciences)**
Troponin I is found exclusively in the myocardium. It is not present in skeletal muscle. Following MI elevated levels are seen by 12 hours and remain elevated for 5-10 days.

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**U**

**Urea & Electrolytes (S) (Blood Sciences)**
This will include Creatinine; Urea; Sodium; Potassium & Bicarbonate. Routinely available 24 hrs/day.

**Urea & Electrolytes (U) (Blood Sciences)**
Routinely performed daily (Mon-Fri). Random and 24hrs samples may be assayed.

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**V**

**Valproate (S) (Blood Sciences)**
Although therapeutic levels of 50-100 mg/L are widely quoted, the presence of a relationship between plasma levels of valproic acid and clinical efficacy is still debated. Assays are performed daily.

**Vancomycin Assay (S) (Blood Sciences)**
By arrangement with Chemistry. (See The Guidelines For The Management Of Common Medical Emergencies And For The Use Of Antimicrobial Drugs “The Grey Book”).
Vanillyl Mandelic Acid (VMA) (Us) (Blood Sciences)
Container for 24 hr. collection with the appropriate preservative may be obtained from the Chemistry Laboratory. This is no longer the first choice screen for phaeochromocytoma (urine metanephrines are more sensitive). All assays performed in a reference laboratory and take approximately 2 weeks.

Vitamin D (S) (Blood Sciences)
25 OH vitamin D may be measured to assess vitamin D stores. 1-25 di OH vitamin D; the active hormone; is useful in rare inborn errors of vitamin D metabolism. Both assays are performed at a reference laboratory and usually take 2-3 weeks.

X

Xanthochromia (Blood Sciences)
Xanthochromia is the name given to the yellow appearance of CSF caused by the breakdown of haemoglobin. Most patients who have CSF taken between 12hrs and 2 weeks after a subarachnoid haemorrhage will have detectable Xanthochromia, provided Xanthrochromia is investigated by spectrophotometry.

Z

Zinc (S) Trace Element tube (Blood Sciences)
Serum zinc may be performed to assess deficiency. Bottles available on request. Performed at a reference centre – taking approx. 2 weeks.