

# **DIRECTORY OF LABORATORY SERVICES**

## **DIVISION OF LABORATORY MEDICINE DEPARTMENT OF PATHOLOGY**

### **INTRODUCTION**

This directory provides details of the extensive range of diagnostic tests offered by the various laboratories in the Division of Laboratory Medicine. If a required test is not currently offered in-house, please contact the appropriate laboratory for further information.

Diagnostic laboratory tests play an increasingly crucial role in patient management. The main aim of the laboratories is to process and test clinical specimens from patients, and to offer high quality service in doing so. The patient is the primary concern of the laboratories. Therefore, to achieve quality results and optimal use of the services, a number of requirements are important and should be adhered to.

Firstly, appropriate samples should be collected using the correct containers, and transported to the laboratory under optimal conditions. This information can be found in the following pages. Secondly, for emr request (e-lab ordering), signature is not required on the slip while for non-emr request, each sample must be accompanied by a signed request form containing all the necessary information. In particular, relevant clinical details should be provided, to assist laboratories in performing the most appropriate tests and interpreting the results. Finally, users are encouraged to talk to the Head and consultants of the laboratories, whether to discuss tests or results, to get advice or to offer feedback. A close working relationship between the users and the laboratory will ultimately benefit the patients.

### **GENERAL**

#### **LOCATION**

The Division of Laboratory Medicine (LMD – previously known as CDL) is located on the 4<sup>th</sup> floor, Menara Timur, PPUM. The Inborn Errors of Metabolism (IEM), Toxicology and Trace Elements Analysis is located on the 6<sup>th</sup> floor, Menara Timur, PPUM.

A satellite laboratory, the Polyclinic Laboratory (Polylab), serves the specialist clinics and primary care clinics is located at the ground floor of the Rawatan Utama (RUKA) Building.

#### **ORGANISATION OF SERVICE**

1. The Core Laboratory which consists of
  - a. Specimen Reception
  - b. Routine Chemistry
  - c. Fluids and Excretion
  - d. Routine Haematology
  - e. Coagulation
2. Special Chemistry
3. Endocrinology
4. Immunology
5. Inborn Errors of Metabolism (IEM)
6. Toxicology and Trace Elements Analysis
7. Special Haematology
8. Bone Marrow and Flowcytometry
9. Molecular and Genetic Analysis (MGAL)
  - a. Cytogenetics
  - b. Molecular (Haematology)

c. Immunogenetics and Transplantation (HLA)

10. Polyclinic Laboratory (Polylab)

**OPERATION HOURS**

The laboratory provides a 24-hour service for routine essential tests while other tests are done during office hours. For urgent tests not provided on 24-hour basis, please contact the Pathologist or senior officer on-call via hospital telephone operator.

**TELEPHONE EXTENSIONS FOR ENQUIRIES (03-7949XXXX)**

|                                        |               |        |
|----------------------------------------|---------------|--------|
| Office                                 | : 2025/2578   |        |
| Reception Counter                      | : 2820        |        |
| Specimen Reception                     | : 2582        |        |
| Routine Chemistry                      | : 2850        |        |
| Fluids & Excretion (F&E)               | : 2371        |        |
| Routine Haematology                    | : 2229        |        |
| Special Chemistry                      | : 2847        |        |
| Special Haematology                    | : 2848        |        |
| Bone Marrow                            | : 2739        |        |
| Immunology                             | : 2849        |        |
| Endocrine                              | : 2846        |        |
| Inborn Errors of Metabolism (IEM)      | : 2584        |        |
| Toxicology and Trace Elements Analysis | : 2584        |        |
| Cytogenetics                           | : 2656        |        |
| Molecular and HLA                      | : 2205        |        |
| Polyclinic Laboratory (Polylab)        | : 2392        |        |
| Chemical Pathologists:                 |               |        |
| Assoc Prof Dr Pavai Sthaneshwar        | : 2788        |        |
| Assoc Prof Dr Malathi Thevarajah       | : 2745        |        |
| Dr Farhi Ain Jamaluddin                | : 2783        |        |
| Haematologists:                        |               |        |
| Dr Mardziah binti Mohamad              | : 3121        |        |
| Dr Hana Shafinaz binti Jamaluddin      | : 4172        |        |
| Dr Poh Kim Yan                         | : 4885        |        |
| Scientific Officers                    |               | : 2580 |
| Putri Junaidah Megat Yunus             | : 2756        |        |
| Mozhofar Md Yusof                      | : 2794        |        |
| Nisya Mohamed Yusoff                   | : 3031        |        |
| Vong Geok Swan                         | : 6394        |        |
| Mohammad Zarizi Abd Ghani              | : 4707        |        |
| Nabihah Nasir                          | : 4707        |        |
| Yeoh Ai Chin                           | : 2784        |        |
| Shanmuganathan Arumugam                |               |        |
| Senior MLT                             |               |        |
| Mohamad Azizi Hamdan (MLT U38)         | : 3134        |        |
| Muhamad Faris Ya'akob (MLT U36)        | : 2577        |        |
| MLT U32                                | : 2577        |        |
| Store                                  | : 3127        |        |
| Medical Officers (MO)                  | : 3278        |        |
| Senior on-call, Biochemistry           | : 019-2008554 |        |
| Senior on-call, Haematology            | : 019-2008553 |        |

## **SPECIMEN COLLECTION AND TRANSPORT**

The tests offered, specimen types and specimen containers are of various types and it is important that specimens are collected and transported properly. Deviations from the instructions given in this guide may result in pre-analytical errors with the specimens not being suitable for testing or giving test results that are of poor quality or are confusing.

Specimens should be sent to the laboratory as soon as possible after collection (<4 hours after collection).

### **BLOOD SPECIMENS**

Blood specimens should be introduced into the specimen tube carefully so as not to cause haemolysis. A closed vacuum blood collection system with the appropriate tubes should be used. As an alternative, a needle and syringe may be used but the blood should not be forced out through the needle as this causes gross haemolysis.

The volume of blood collected should be as indicated on the sample tube. Insufficient sampling will cause an incorrect sample to anticoagulant ratio, leading to erroneous results. Blood collected into tubes with anticoagulants, preservatives or clot activators should be mixed immediately after collection by gently inverting the tubes a few times. The recommended order of draw and inversion is:

1. Blood culture tubes: 8 - 10 times inversion
2. Coagulation tubes (Na citrate, light blue): 3 - 4 times inversion
3. Tubes with no additives (plain, SST Gel)  
SST Gel, yellow: 5 times inversion  
Plain, red: 5 times inversion
4. Heparin tube, green: 8 - 10 times inversion
5. EDTA tube, lavender: 8 - 10 times inversion
6. Fluoride tube (glucose), grey: 8 - 10 times inversion

### **URINE SPECIMENS**

Urine containers should be screwed on tightly to prevent leakage. 24 hour and other timed urine collection procedures should be explained to the patients to ensure proper collection.

#### **Random Specimen**

This is the urine specimen most commonly sent to the laboratory for analysis. Random specimens can sometimes give an inaccurate view of a patient's health if the specimen is too diluted and analyte values are artificially lowered. Avoid the introduction of contaminants into the specimen by giving explicit instructions to patients so that they do not touch the inside of the cup or cup lid.

#### **First Morning Specimen**

This is the specimen of choice for urinalysis and microscopic analysis, since the urine is more concentrated and contains relatively higher levels of cellular elements and analytes.

#### **Procedure:**

1. Empty the bladder before going to bed at night.
2. Collect the first morning specimen on waking up in the morning.

#### **Midstream Clean Catch Specimen**

This is the preferred type of urine specimen because of the reduced incidence of cellular and microbial contamination. The procedure significantly reduces the opportunities for contaminants to enter into the urine stream.

#### **Procedure:**

1. Cleanse the urethral area.

2. Pass the first portion of the urine stream into the toilet.
3. Collect the midstream urine into the container. Any excess urine should be voided into the toilet.

### **24 Hour Specimen**

A 24 hours urine specimen is collected to measure the concentration in urine over a whole day. Accurate timing is critical to the calculations that are conducted to determine analyte concentrations and ratios. Interpretations based on faulty calculations can result in improper diagnosis or medical treatment. The specimen should be refrigerated during the collection period.

#### Procedure:

1. Empty the bladder into the toilet before beginning the collection. Record the date and time on the label of the container.
2. For the duration of the 24 hours, all urine MUST be collected and pooled into the container.
3. Exactly 24 hours after starting the collection, urinate one last time and add it to the container. Record the date and time onto the label of the container.

### **REQUEST FORMS**

For internal patient, please use e-laboratory ordering system in eMR (refer Guideline for Recording Nursing Care Record, DS-0742).

Manual request form used during contingency period. Please ensure that forms are properly and clearly filled is only by the requesting doctor. Relevant information regarding provisional diagnosis, treatment and other information relevant to the test required should be provided. The request form should be signed by the requesting doctor and the doctor's name stamped or clearly written. Users of the service are urged to be selective and confine tests required to those that are useful for the diagnosis or control of treatment of patients. Below is the list of forms used in our laboratory.

| <b>BIL</b> | <b>FORM TITLE</b>                                            | <b>REFERENCE NUMBER</b> |
|------------|--------------------------------------------------------------|-------------------------|
| <b>1</b>   | Molecular and Genetics Analysis Laboratory                   | BK-MIS-1145             |
| <b>2</b>   | Peripheral Blood, Bone Marrow and Flow Cytometry Examination | BK-MIS-1146             |
| <b>3</b>   | STAT Request Form                                            | BK-MIS-330              |
| <b>4</b>   | Cytogenetics Laboratory                                      | BK-MIS-941              |
| <b>5</b>   | Inborn Errors Metabolism Laboratory                          | BK-MIS-054              |
| <b>6</b>   | Routine Chemistry and Haematology                            | BK-MIS-331              |
| <b>7</b>   | Penghantaran Sampel Pesakit ke Makmal Rujukan                | BK-DLS-002              |

### **TRANSPORT OF SPECIMENS**

All specimens are to be sent immediately via the pneumatic tube system unless otherwise instructed in this guide.

### **SPECIMEN REJECTION**

Samples that do not meet the requirements will be rejected. The criteria for rejection are many and may include:

- a. Incorrect tube/container
- b. Unlabeled samples and forms
- c. Wrongly labeled samples and forms
- d. Insufficient sample volume
- e. Clotted Sample
- f. Haemolysed sample
- g. Grossly Lipaemic sample
- h. Grossly icteric samples

- i. Leaking containers
- j. Improper transport condition
- k. Overnight/delayed sample
- l. Insufficient clinical information
- m. No doctor's name and signature

### SPECIAL TEST PROCEDURE

#### ORAL GLUCOSE TOLERANCE TEST (OGTT)

##### **Indication:**

This test is principally used for diagnosis when blood glucose levels are equivocal, during pregnancy or in epidemiological studies. In the absence of classical symptoms, random plasma glucose is the recommended first test, and at least two diagnostic glucose results on different days are essential. If the fasting level is < 6.1mmol/l, diabetes mellitus is excluded and a GTT is **not** indicated. A random level of < 11.1mmol/l or a fasting level of < 7.0 mmol/l is indicative of diabetes mellitus. An oral GTT may be conducted if the random glucose is between 5.6 – 11.0 mmol/l or the fasting level is between 6.1 – 6.9 mmol/l (WHO 1999, Ann Clin Biochem 2000; 37:588-592).

##### **Procedure:**

To conduct an oral GTT, the patient should have been on a normal diet (containing at least 150g of carbohydrate daily) and usual physical activity for at least 3 days prior to the test. The patient must fast overnight (8-14 hours). Plain water is allowed. Smoking is not permitted during the test and the presence of factors that influence interpretation of the results must be recorded (eg. medications, inactivity, infection etc.).

Take a fasting venous blood sample for glucose estimation. An adult patient should drink 75g of anhydrous glucose (or 82.5g of glucose monohydrate) in a glass of water (300 ml) over 5 mins. For children, the test load should be 1.75g of glucose/kg body weight up to a maximum of 75g.

At 2 hours after the glucose load, take a venous blood sample for glucose estimations. For a 3-point GTT, take an additional sample at 1 hour after the glucose load. Send all samples together to the laboratory, clearly labelled with the times of collection.

##### **Interpretation of results:**

Based on WHO guidelines for venous plasma samples:

| <b>Condition</b>                        | <b>Glucose concentration (mmol/l)</b> |
|-----------------------------------------|---------------------------------------|
| <b>Diabetes mellitus</b>                |                                       |
| Fasting                                 | < 7.0                                 |
| <b>or</b>                               |                                       |
| 2 hours after glucose load              | < 11.1                                |
| <b>Impaired glucose tolerance (IGT)</b> |                                       |
| Fasting (if measured)                   | < 7.0                                 |
| <b>and</b>                              |                                       |
| 2 hours after glucose load              | 7.8 – 11.0                            |
| <b>Impaired fasting glycemia (IFG)</b>  |                                       |
| Fasting                                 | 6.1 – 6.9                             |
| <b>and (if measured)</b>                |                                       |
| 2 hours after glucose load              | < 7.8                                 |

## **TUMOUR MARKERS – A brief clinical practice guide**

The table below is a brief guideline on clinical significance of the various tumour markers.

***Tumour markers should not be used for screening, the exception being AFP.***

| Tumour Marker | Malignancy                            | Clinical Significance * |   |   |   |   |
|---------------|---------------------------------------|-------------------------|---|---|---|---|
|               |                                       | S                       | D | P | M | R |
| AFP           | Yolk sac tumour, Hepatoma             | √                       | √ | √ | √ | √ |
| HCG           | Trophoblastic tumour, choriocarcinoma |                         | √ | √ | √ | √ |
| CEA           | Colorectal carcinoma                  |                         |   | √ | √ | √ |
| PSA           | Prostatic carcinoma                   |                         | √ | √ | √ | √ |
| CA 125        | Ovarian carcinoma                     |                         | √ |   | √ | √ |
| CA 15-3       | Breast carcinoma                      |                         |   | √ |   | √ |
| CA 19-9       | Pancreatic carcinoma                  |                         | √ | √ | √ | √ |
| hTG           | Thyroid carcinoma                     |                         | √ | √ | √ | √ |

\* S - Screening                      M - Monitoring and Treatment  
 D - Diagnosis                        R - Reduction of recurrence  
 P - Prognosis

Reference: Clinical Practice Guidelines on Serum Tumour Markers, Dr. Leslie Lai. Academy of Medicine of Malaysia, Serial No. 7/2003.

### **Primary hyperaldosteronism – guidelines for investigation**

**Patient preparation:** The renin-aldosterone axis is primarily regulated by renal blood flow, therefore:

1. Subjects under investigation should ideally not be taking any drugs that interfere with fluid balance or potassium (Table 1).
2. Patients should not consume products derived from liquorice root e.g. confectionary liquorice and chewing tobacco.
3. Patient should be having normal sodium diet (100-200 mmol/day) for at least three days.
4. Plasma potassium levels should be normal when collecting sample for aldosterone and renin

| <b>Drug</b>              | <b>Time to remove interference</b> |
|--------------------------|------------------------------------|
| ACE inhibitors           | 2 weeks                            |
| β-blockers               | 2 weeks                            |
| Calcium channel blockers | 2 weeks                            |
| Diuretics                | 2 weeks                            |
| NSAIDs                   | 2 weeks                            |
| Oestradiol               | 6 weeks                            |
| Spironolactone           | 6 weeks                            |

**Table 1:** Interfering drugs and period of withdrawal

**If these drugs cannot be withdrawn, please refer to Table 2 for interpretation of the results.**

| Factor                                              | Effect on aldosterone concentration | Effect on renin activity | Effect on ARR |
|-----------------------------------------------------|-------------------------------------|--------------------------|---------------|
| <b>Medications</b>                                  |                                     |                          |               |
| β-adrenergic blockers                               | ↓                                   | ↓↓                       | ↑ (FP)        |
| Central α-2 agonists (e.g. clonidine, α-methyldopa) | ↓                                   | ↓↓                       | ↑ (FP)        |
| NSAIDs                                              | ↓                                   | ↓↓                       | ↑ (FP)        |
| K <sup>+</sup> wasting diuretics                    | → ↑                                 | ↑↑                       | ↓ (FN)        |
| K <sup>+</sup> sparing diuretics                    | ↑                                   | ↑↑                       | ↓ (FN)        |
| ACE inhibitors                                      | ↓                                   | ↑↑                       | ↓ (FN)        |
| ARBs                                                | ↓                                   | ↑↑                       | ↓ (FN)        |
| Ca <sup>2+</sup> blockers (DHPs)                    | → ↑                                 | ↑                        | ↓ (FN)        |
| Renin inhibitors                                    | ↓                                   | ↓                        | ↑ (FP)        |
| <b>Potassium status</b>                             |                                     |                          |               |
| Hypokalaemia                                        | ↓                                   | → ↑                      | ↓ (FN)        |
| Potassium loading                                   | ↑                                   | → ↓                      | ↑ (FP)        |
| <b>Dietary sodium</b>                               |                                     |                          |               |
| Sodium restricted                                   | ↑                                   | ↑↑                       | ↓ (FN)        |
| Sodium loaded                                       | ↓                                   | ↓↓                       | ↑ (FP)        |
| <b>Advancing age</b>                                |                                     |                          |               |
|                                                     | ↓                                   | ↓↓                       | ↑ (FP)        |
| <b>Other conditions</b>                             |                                     |                          |               |
| Renal impairment                                    | →                                   | ↓                        | ↑ (FP)        |
| PHA-2                                               | →                                   | ↓                        | ↑ (FP)        |
| Pregnancy                                           | ↑                                   | ↑↑                       | ↓ (FN)        |
| Renovascular HT                                     | ↑                                   | ↑↑                       | ↓ (FN)        |
| Malignant HT                                        | ↑                                   | ↑↑                       | ↓ (FN)        |

PHA-2 Pseudohypoaldosteronism type 2

Table 2: Factors that may affect the ARR and thus lead to false-positive or false-negative results

**Sample collection:** The Aldosterone renin ratio is most sensitive when used in patients from whom samples are collected in the morning after patients have been out of bed for at least 2 h, usually after they have been seated for 5–15 min.

**Samples for both renin and aldosterone should be sent together.** Isolated aldosterone or renin may not help in the diagnosis. **Sample for aldosterone and renin should be collected in the EDTA tube.** After collection of the samples, it should be **sent to the lab immediately within 30 minutes.**

**Please note:**

1. **If the posture is not mentioned in the requesting form, it will be assumed that the sample is collected in the upright posture and the results will be reported as per that reference interval.**
2. **If only aldosterone or renin is requested, lab will not proceed with the investigation and the sample will be rejected.**

## SERVICES PROVIDED

### 24 HOUR ROUTINE ESSENTIAL OR STAT SERVICE

The laboratory offers a range of important and essential tests for STAT and for after office hours. The service is restricted and is offered for patients faced with life threatening situations requiring emergency testing. **It should not be used to investigate 'cold' cases for elective surgery or for screening for admission.** If the service is abused, the turn-around time for STAT testing will be severely affected.

The STAT tests offered are as below. If a test not listed is required urgently, please contact the Pathologist or M.O. on-call via hospital telephone operator.

#### **Biochemistry Profiles**

Arterial Blood Gases  
Venous Blood Gases  
Renal Function Test

#### **Biochemistry Tests**

Alanine Aminotransferase (ALT)  
Ammonia  
Amylase – Urine and Serum  
AST  
Bilirubin – Total  
C-Reactive Protein (CRP)  
Calcium  
Glucose  
Lactate  
Osmolality – Urine and Serum  
Paracetamol  
Phosphate  
Procalcitonin  
Salicylate

#### **Cardiac Markers**

CKMB Mass  
NT-proBNP/BNP  
Troponin I

#### **Toxicology**

Urine Toxicology Screening

#### **Special Chemistry**

Paraquat – Urine

#### **Fluids & Excretion**

CSF Examination  
Urine Pregnancy Test  
Urinalysis (UFEME)  
FEME - Synovial Fluid  
FEME - Other Body Fluids

#### **Haematology**

CBC  
CBC + Differential Count  
PBF (urgent report shall consult  
Haematologist)  
PT  
APTT  
Coagulation Screen  
  
DIVC Screen

## **LABORATORY SERVICES**

The services available are listed here in alphabetical order as single tests. If a test is not found in the single tests list, it may be under the profiles/packages lists (for Chemistry, Immunology, Endocrine and Haematology), which can be found further down in the directory. Specimen collection/tube guides and specimen volumes given are for adults. For paediatrics, when only small volumes of blood can be taken, please use similar paediatric tubes.

The turn-around time (TAT) is the time between sample arrivals in the laboratory until the appearance of technically validated results.

| Test name                             | Sample | Container  | Cap Colour | Volume     | Expected TAT                                  | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)             |
|---------------------------------------|--------|------------|------------|------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 17-OH Progesterone                    | Serum  | Plain      | Red        | 5 ml       | 14 working days                               | -                                                                                                                                                                                                                                                               | Endocrine (2846)          |
| Acetylcholine Receptor Antibody       | Serum  | Plain      | Red        | 5 ml       | 1 month (Freq of testing is by batch)         | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Immunology (2849)         |
| Activated Protein C Resistance (APCR) | Plasma | Na citrate | Blue       | 1 x 2.7 ml | 14 working days (sample received office hour) | For private request, blood volume to be followed strictly. Patient's anticoagulant therapy must be indicated in the request form                                                                                                                                | Special Hematology (2848) |

| Test name                           | Sample | Container    | Cap Colour | Volume   | Expected TAT                               | Remarks                                                                                                                                                                                                                                                                                                                           | Lab (ext no.)            |
|-------------------------------------|--------|--------------|------------|----------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Adrenocorticotrophic Hormone (ACTH) | Plasma | EDTA         | Purple     | 3 ml     | 5 working days (Freq of testing is weekly) | Place specimen on ice water and send to lab immediately within 30 mins                                                                                                                                                                                                                                                            | Endocrine (2846)         |
| Alanine Aminotransferase (ALT)      | Serum  | SST Gel Tube | Yellow     | 3.5 ml   | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                                                                                                                                                                                                                                                 | Routine Chemistry (2850) |
| Albumin                             | Serum  | SST Gel Tube | Yellow     | 3.5 ml   | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                                                                                                                                                                                                                                                 | Routine Chemistry (2850) |
| Albumin, Fluid                      | Fluid  | SST Gel Tube | Yellow     | 1 ml     | Routine : 2 Hours                          | -                                                                                                                                                                                                                                                                                                                                 | Routine Chemistry (2850) |
| Aldosterone                         | Plasma | EDTA         | Purple     | 2 x 3 ml | 14 working days                            | 1. Renin MUST be requested together with Aldosterone – request will be rejected if only any one test is requested. Both tests require a minimum 3ml of blood in EDTA tube and send to the lab within 30 minutes after collection, at room temperature.<br><br>2. External samples from outside of UMMC should be delivered frozen | Endocrine (2846)         |
| Alkaline Phosphatase                | Serum  | SST Gel Tube | Yellow     | 3.5 ml   | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                                                                                                                                                                                                                                                 | Routine Chemistry (2850) |

| Test name                                                           | Sample                      | Container    | Cap Colour | Volume  | Expected TAT                               | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)           |
|---------------------------------------------------------------------|-----------------------------|--------------|------------|---------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| ALL screen (E2A-PBX1, ETV6-RUNX1, MLL-AF4, BCR-ABL1 e1a2, SIL-TAL1) | Whole blood/<br>Bone marrow | EDTA         | Purple     | 2 x 3ml | 14 working days                            | Tests for in-house samples are ordered by Haemathologists. Send sample within 24hrs of collection                                                                                                                                                               | MGAL – Molecular (2205) |
| Allergy testing 54 Allergens                                        | Serum                       | Plain        | Red        | 5 ml    | 5 working days                             | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Immunology (2849)       |
| Alpha-1 Antitrypsin (AAT)                                           | Serum                       | Plain        | Red        | 5 ml    | 5 working days (freq of testing is weekly) | -                                                                                                                                                                                                                                                               | Immunology (2849)       |
| Alpha-Fetoprotein (AFP)                                             | Serum                       | SST Gel Tube | Yellow     | 3 ml    | 1 working day                              | Patients undergoing amniocentesis should have their blood for AFP drawn first                                                                                                                                                                                   | Endocrine (2846)        |
| Alpha-Fetoprotein (AFP)                                             | Fluid                       | SST Gel Tube | Yellow     | 1 mL    | 1 Working Day                              | -                                                                                                                                                                                                                                                               | Endocrine (2846)        |
| Alpha Thalassaemia                                                  | Whole blood                 | EDTA         | Purple     | 3ml     | 45 working days                            | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205) |

| Test name        | Sample                    | Container                       | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                 | Lab (ext no.)                     |
|------------------|---------------------------|---------------------------------|------------|--------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Aluminium, Serum | Serum                     | Plain (Trace Element Free)      | Dark Blue  | 5 ml         | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (Plain Trace Element-free) tube at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| Aluminium, Urine | Urine, 24 hours or Random | Acid washed urine bottle or cup | -          | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab                                | Toxicology & Trace Element (2584) |
| Amikacin         | Serum                     | Plain                           | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                                                                                                                                       | Special Chemistry (2847)/TDM      |

| Test name                                               | Sample                   | Container                         | Cap Colour | Volume                          | Expected TAT                              | Remarks                                                                                                                                    | Lab (ext no.)            |
|---------------------------------------------------------|--------------------------|-----------------------------------|------------|---------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Amino Acids & Acylcarnitines (Newborn more than 7 days) | Dried Blood Spots        | Whatmann 903 special filter paper | -          | Fill all the circles with blood | 5 working days (freq of testing is daily) | Completely dry the blood spots at room temperature. Place dried filter paper in an individual envelope or plastic bag for transport        | IEM (2584)               |
| Amino Acids, CSF                                        | CSF                      | Plain sterile                     | -          | 0.5-1 ml                        | 5 working days (freq of testing is daily) | Send together with plasma. Transport immediately to the lab or freeze sample                                                               | IEM (2584)               |
| Amino Acids, plasma                                     | Blood                    | Heparin                           | Green      | 1 – 2 ml                        | 5 working days (freq of testing is daily) | Avoid haemolysis. Send blood immediately to the lab. (For referring lab, centrifuge blood and freeze plasma immediately. Transport frozen) | IEM (2584)               |
| Amino Acids, Urine                                      | Urine                    | Plain cup                         | -          | 5 ml                            | 5 working days (freq of testing is daily) | Send together with plasma. Transport immediately to the lab or freeze sample                                                               | IEM (2584)               |
| AML screen (RUNX1-RUNX1T1, CFBF-MYH11)                  | Whole blood/ Bone marrow | EDTA                              | Purple     | 2 x 3ml                         | 14 working days                           | Tests for in-house samples are ordered by Haemopathologists. Send sample to the lab within 24hrs of collection                             | MGAL – Molecular (2205)  |
| Ammonia                                                 | Plasma                   | Heparin                           | Green      | 3.0 ml                          | 2 Hours                                   | Inform lab if after office hours (ext 2582/2850). Send fresh sample immediately (in ice slush)                                             | Routine Chemistry (2850) |

| Test name                                    | Sample       | Container    | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)            |
|----------------------------------------------|--------------|--------------|------------|--------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Amphetamine / Methamphetamine                | Urine        | Plain Cup    | -          | As collected | 1 working day                               | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Special Chemistry (2847) |
| Amylase, Serum                               | Serum        | SST Gel Tube | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Amylase, Urine                               | Urine random | Plain cup    | Yellow     | 5 ml         | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Amylase, Fluid                               | Fluid        | SST Gel Tube | Yellow     | 1 ml         | Routine : 2 Hours                           | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Angelman and Prader Willi (15q11-13)         | Whole blood  | EDTA         | Purple     | 3ml          | 90 working days                             | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205)  |
| Anticardiolipin Ab (ACA)                     | Serum        | Plain        | Red        | 5 ml         | 10 working days (freq of testing is weekly) | -                                                                                                                                                                                                                                                               | Immunology (2849)        |
| Anti-cyclic citrullinated peptide (Anti-CCP) | Serum        | Plain        | Red        | 5 ml         | 5 working days (freq of testing is weekly)  | -                                                                                                                                                                                                                                                               | Immunology (2849)        |

| Test name                                       | Sample | Container  | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)             |
|-------------------------------------------------|--------|------------|------------|--------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Anti-Mullerian Hormone (AMH)                    | Serum  | Gel        | Yellow     | 3 ml         | 5 working days                              | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)          |
| Anti-Neutrophilic Cytoplasmic Antibodies (ANCA) | Serum  | Plain      | Red        | 5 ml         | 10 working days (freq of testing is weekly) | -                                                                                                                                                                                                                                                               | Immunology (2849)         |
| Antinuclear Factor (ANF)                        | Serum  | Plain      | Red        | 5 ml         | 10 working days (freq of testing is weekly) | -                                                                                                                                                                                                                                                               | Immunology (2849)         |
| Antistreptolysin-O (ASO)                        | Serum  | Plain      | Red        | 5 ml         | 5 working days (freq of testing is weekly)  | -                                                                                                                                                                                                                                                               | Immunology (2849)         |
| Anti-thrombin III                               | Plasma | Na Citrate | Blue       | 1 x 2.7 ml   | 14 working days                             | Blood volume to be followed strictly. Clinical information must be provided                                                                                                                                                                                     | Special Hematology (2848) |
| APTT (activated partial thromboplastin time)    | Plasma | Na Citrate | Blue       | 1.8 / 2.7 ml | 2 Hours                                     | Blood volume to be followed strictly. Sample should be sent to the laboratory within 2 hours of collection                                                                                                                                                      | Special Hematology (2848) |

| Test name                                                | Sample                 | Container                       | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                          | Lab (ext no.)                     |
|----------------------------------------------------------|------------------------|---------------------------------|------------|--------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Arsenic, Urine                                           | Urine, Random or 24 Hr | Acid washed urine bottle or cup | -          | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| Aspartate Aminotransferase (AST)                         | Serum                  | SST Gel Tube                    | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                                                                                | Routine Chemistry (2850)          |
| Autoimmune Liver Antibody Profile (LKM1, LC1, SLA, AMA2) | Serum                  | Plain                           | Red        | 5 ml         | One month                                   | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur)                                  | Immunology (2849)                 |

| Test name                                    | Sample      | Container | Cap Colour | Volume  | Expected TAT                               | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)               |
|----------------------------------------------|-------------|-----------|------------|---------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| B-type natriuretic peptide (BNP) / NT-proBNP | Plasma      | EDTA      | Purple     | 3.5ml   | 1 working day                              | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)            |
| BCR-ABL1 detection (e1a2, e13a2, e14a2)      | Whole blood | EDTA      | Purple     | 2 x 3ml | One month (Freq of testing is monthly)     | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205)     |
| BCR-ABL1 quantitation (e13a2, e14a2)         | Whole blood | EDTA      | Purple     | 2 x 3ml | 21 working days                            | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205)     |
| Bence Jones Protein                          | Urine       | Plain cup | -          | 5 ml    | 1 working day                              | Early morning sample preferred                                                                                                                                                                                                                                  | F&E (2371) / Polylab (2392) |
| Beta-2 Microglobulin, Serum                  | Serum       | Plain     | Red        | 5 ml    | 5 working days (Freq of testing is weekly) | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)            |

| Test name                   | Sample      | Container | Cap Colour | Volume       | Expected TAT                               | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)            |
|-----------------------------|-------------|-----------|------------|--------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Beta-2 Microglobulin, Urine | Urine       | Plain cup | -          | As collected | 5 working days (Freq of testing is weekly) | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)         |
| Beta-CrossLaps (B-CTX)      | Plasma      | EDTA      | Purple     | 3ml          | 5 working days (Freq of testing is weekly) | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Special Chemistry (2847) |
| Beta Thalassaemia           | Whole blood | EDTA      | Purple     | 3ml          | 30 working days                            | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205)  |
| Bile Acids, Total           | Serum       | Plain     | Red        | 5 ml         | 3 working days                             | Main indication is suspected obstetric cholestasis in pregnant women. Fasting sample is preferred though not essential                                                                                                                                          | Special Chemistry (2847) |

| Test name                                  | Sample                         | Container                           | Cap Colour                              | Volume                          | Expected TAT                               | Remarks                                                                                             | Lab (ext no.)             |
|--------------------------------------------|--------------------------------|-------------------------------------|-----------------------------------------|---------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|
| Bilirubin, Total                           | Serum                          | SST Gel Tube                        | Yellow                                  | 3.5 ml                          | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                   | Routine Chemistry (2850)  |
| Bilirubin, Total                           | Fluid                          | SST Gel Tube                        | Yellow                                  | 1 mL                            | Routine : 2 Hours                          | -                                                                                                   | Routine Chemistry (2850)  |
| Bleeding Time                              | Whole Blood                    | Ear prick                           | -                                       | 1 prick                         | 1 working day                              | Please call ext. 2848 to make an appointment.                                                       | Special Hematology (2848) |
| Blood Gases, Arterial / Venous             | Whole Blood, Arterial / Venous | Heparinised syringe                 | -                                       | 2 ml                            | 30 mins                                    | Clotted sample will be rejected. Cap syringe and send in ice water ASAP to reach Lab within 30 mins | Routine Chemistry (2850)  |
| Bone Marrow Aspirate, Follow-up            | Bone Marrow Aspirate           | Slides, EDTA x2                     | Purple (EDTA)                           | 2-3 ml                          | 5 working days                             | Appointment required (ext 2739). Refer to profile list for more information                         | Bone Marrow (2739)        |
| Bone Marrow Aspirate, Full work-up         | Bone Marrow Aspirate           | Slides, EDTA x3, Lithium Heparin x1 | Purple (EDTA) & Green (Lithium Heparin) | 2-3 ml (EDTA & Lithium Heparin) | 21 days                                    | Appointment required (ext 2739). Refer to profile list for more information                         | Bone Marrow (2739)        |
| Bone Marrow Trepine Biopsy                 | Trepine Biopsy                 | Formalin tube                       | -                                       | -                               | 14 working days                            | Appointment required (ext 2739). Refer to profile list for more information                         | Bone Marrow (2739)        |
| C-Peptide                                  | Serum                          | Plain                               | Red                                     | 5 ml                            | 5 working days (Freq of testing is weekly) | -                                                                                                   | Endocrine (2846)          |
| C-Reactive Protein (CRP)                   | Serum                          | SST Gel Tube                        | Yellow                                  | 3.5 ml                          | 2 hour                                     | -                                                                                                   | Routine Chemistry (2850)  |
| C-Reactive Protein, Hypersensitive (hsCRP) | Serum                          | Plain tube                          | Red                                     | Paeds 2 ml, adult 3 ml          | 1 working day                              | -                                                                                                   | Immunology (2849)         |

| Test name      | Sample      | Container                 | Cap Colour | Volume | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                                        | Lab (ext no.)                     |
|----------------|-------------|---------------------------|------------|--------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| CA 125         | Serum       | SST Gel Tube              | Yellow     | 3.5 ml | 1 working day                               | Tumour marker primarily for the monitoring of ovarian cancer                                                                                                                                                                                                                                                                   | Endocrine (2846)                  |
| CA 125         | Fluid       | SST Gel Tube              | Yellow     | 1 ml   | 1 working day                               | -                                                                                                                                                                                                                                                                                                                              | Endocrine (2846)                  |
| CA 15-3        | Serum       | Plain                     | Red        | 5 ml   | 1 working days                              | Tumour marker primarily for the monitoring of breast cancer                                                                                                                                                                                                                                                                    | Endocrine (2846)                  |
| CA 15-3        | Fluid       | Plain                     | Red        | 1 ml   | 1 working days                              | -                                                                                                                                                                                                                                                                                                                              | Endocrine (2846)                  |
| CA 19-9        | Serum       | Plain                     | Red        | 5 ml   | 1 working days                              | -                                                                                                                                                                                                                                                                                                                              | Endocrine (2846)                  |
| CA 19-9        | Fluid       | Plain                     | Red        | 1 ml   | 1 working days                              | -                                                                                                                                                                                                                                                                                                                              | Endocrine (2846)                  |
| Cadmium, Blood | Whole Blood | EDTA (Trace Element Free) | Dark Blue  | 5 ml   | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (EDTA Trace Element-free) tube at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |

| Test name          | Sample        | Container             | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                  | Lab (ext no.)                     |
|--------------------|---------------|-----------------------|------------|--------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Cadmium, Urine     | Urine, Random | Acid washed Urine cup | -          | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| Calcium, Serum     | Serum         | SST Gel Tube          | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins         | Avoid prolonged venous stasis. Albumin shall be ordered together for calculation of corrected calcium                                                                                                                                                                    | Routine Chemistry (2850)          |
| Calcium, Urine 24H | Urine 24 hr   | 6N HCl (24 hr)        | -          | As collected | Routine : 2 Hours                           | -                                                                                                                                                                                                                                                                        | Routine Chemistry (2850)          |
| Calprotectin       | Stool         | Plain Cup             | -          | As collected | 1 working day                               | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur)          | Immunology (2849)                 |
| Carbamazepine      | Serum         | Plain                 | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                                                                                                        | Special Chemistry (2847)/TDM      |

| Test name                 | Sample      | Container    | Cap Colour | Volume | Expected TAT                                             | Remarks                                                                           | Lab (ext no.)            |
|---------------------------|-------------|--------------|------------|--------|----------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------|
| CD4/CD8 Counts            | Whole blood | EDTA         | Purple     | 3 ml   | 3 working days<br>(Freq of testing is every Tue and Fri) | Sample from outside of UMMC should be delivered to the lab by 12pm. (Tue and Fri) | Immunology (2849)        |
| CEA                       | Serum       | SST Gel Tube | Yellow     | 3 ml   | 1 working day                                            | -                                                                                 | Endocrine (2846)         |
| CEA                       | Fluid       | SST Gel Tube | Yellow     | 1 ml   | 1 working day                                            | -                                                                                 | Endocrine (2846)         |
| Ceruloplasmin             | Serum       | Plain        | Red        | 5 ml   | 1 working day                                            | -                                                                                 | Special Chemistry (2847) |
| Chimerism Analysis (STR)  | Whole blood | EDTA         | Purple     | 3ml    | 30 working days                                          | Send sample within 24hrs of collection                                            | MGAL – Molecular (2205)  |
| Cholesterol, HDL          | Serum       | SST Gel Tube | Yellow     | 3.5 ml | 2 Hours                                                  | Fasting sample preferred                                                          | Routine Chemistry (2850) |
| Cholesterol, Total        | Serum       | SST Gel Tube | Yellow     | 3.5 ml | 2 Hours                                                  | Fasting sample preferred                                                          | Routine Chemistry (2850) |
| Cholesterol, Total        | Fluid       | SST Gel Tube | Yellow     | 1 ml   | 2 Hours                                                  | -                                                                                 | Routine Chemistry (2850) |
| Cholinesterase            | Serum       | Plain        | Red        | 5 ml   | 1 working day                                            | -                                                                                 | Routine Chemistry (2850) |
| Chromatography for sugars | Urine       | Plain        | -          | 10 ml  | 30 working days                                          | -                                                                                 | IEM (2584)               |

| Test name                                                             | Sample        | Container                  | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                                         | Lab (ext no.)                     |
|-----------------------------------------------------------------------|---------------|----------------------------|------------|--------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Chromium, Serum                                                       | Serum         | Plain (Trace Element Free) | Dark Blue  | 5 ml         | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (Plain Trace Element-free) tube at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| Chromium, Urine                                                       | Urine, random | Acid washed urine cup      | -          | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab                                | Toxicology & Trace Element (2584) |
| CKMB – mass                                                           | Serum         | SST Gel Tube               | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins         | If results support diagnosis of MI, Troponin is NOT required                                                                                                                                                                                                                                                                    | Routine Chemistry (2850)          |
| Coagulation Factor Assay (FII, FV, FVII, FVIII, FIX, FX, FXI or FXII) | Plasma        | Na Citrate                 | Blue       | 2 x 2.7 ml   | 7 working days                              | Blood volume to be followed strictly. Clinical information must be provided                                                                                                                                                                                                                                                     | Special Hematology (2848)         |
| Complement 3 (C3)                                                     | Serum         | Plain                      | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                                                                                                                                                               | Immunology (2849)                 |
| Complement 4 (C4)                                                     | Serum         | Plain                      | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                                                                                                                                                               | Immunology (2849)                 |

| Test name                                            | Sample                 | Container                       | Cap Colour | Volume                | Expected TAT                                | Remarks                                                                               | Lab (ext no.)                     |
|------------------------------------------------------|------------------------|---------------------------------|------------|-----------------------|---------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------|
| Complements (C3, C4)                                 | Serum                  | Plain                           | Red        | 5 ml                  | 1 working day                               | -                                                                                     | Immunology (2849)                 |
| Complete Blood Count (CBC) / CBC Diff                | Whole Blood            | EDTA                            | Purple     | 3 ml                  | Routine: 2 hour<br>STAT : 45 mins           | Sample to be sent to the laboratory within 2 hours of collection.                     | Routine Hematology (2229)         |
| Conventional Cytogenetics (Genetics)                 | Whole Blood            | Lithium Heparin                 | Green      | Paeds 2 ml Adult 3 ml | 28 days                                     | Tests for in-house                                                                    | Cytogenetic (2656)                |
| Conventional Cytogenetics (Hematological Malignancy) | Bone Marrow            | Lithium Heparin                 | Green      | Paeds 2 ml Adult 3 ml | 21 days                                     | Tests for in-house                                                                    | Cytogenetic (2656)                |
| Copper, Serum                                        | Serum                  | Plain ( Trace Element Free)     | Dark Blue  | 5 ml                  | 10 working days (Freq of testing is weekly) | Collect the special tube at Toxicology Lab (6th Floor, Menara Timur)                  | Toxicology & Trace Element (2584) |
| Copper, Urine                                        | Urine, 24 hr or random | Acid washed urine bottle or cup | -          | As collected          | 10 working days (Freq of testing is weekly) | Collect the container at Toxicology Lab (6th Floor, Menara Timur)                     | Toxicology & Trace Element (2584) |
| Cortisol, Serum                                      | Serum                  | SST Gel Tube                    | Yellow     | 3 ml                  | 1 working day                               | Patients should not be on Prednisolone, Prednisone or other synthetic corticosteroids | Endocrine (2846)                  |
| Cortisol, Urine 24 Hr                                | Urine                  | Plain (24 hr)                   | -          | As collected          | 1 working day                               | -                                                                                     | Endocrine (2846)                  |
| Creatine Kinase                                      | Serum                  | SST Gel Tube                    | Yellow     | 3.5 ml                | Routine : 2 Hours<br>STAT : 60 mins         | If results support diagnosis of MI, Troponin is NOT required                          | Routine Chemistry (2850)          |
| Creatinine                                           | Serum                  | SST Gel Tube                    | Yellow     | 3.5 ml                | Routine : 2 Hours<br>STAT : 45 mins         | -                                                                                     | Routine Chemistry (2850)          |
| Creatinine                                           | Fluid                  | SST Gel Tube                    | Yellow     | 1.0 mL                | Routine : 2 Hours                           | -                                                                                     | Routine Chemistry (2850)          |

| Test name                 | Sample      | Container       | Cap Colour | Volume                   | Expected TAT                                | Remarks                                                                     | Lab (ext no.)                               |
|---------------------------|-------------|-----------------|------------|--------------------------|---------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------|
| Creatinine , Urine 24H    | Urine 24 hr | Plain (24 hr)   | -          | As collected             | 2 Hours                                     | -                                                                           | Routine Chemistry (2850)                    |
| Cryoglobulin              | Serum       | Plain           | Red        | 2 x 5 ml                 | 3 working days                              | Please call ext. 2848 to make an appointment. Overnight fasting is required | Special Hematology (2848)                   |
| CSF examination           | CSF         | Plain (Sterile) | -          | 2 ml                     | 4 Hours                                     | Send immediately to the lab (within 30 mins)                                | F&E (2371)                                  |
| Cyclosporin               | Whole Blood | EDTA            | Purple     | 3 ml                     | 1 working day                               | Clotted sample will be rejected                                             | Special Chemistry (2847)                    |
| Cytospin                  | CSF         | Plain sterile   | White      | 0.5 ml                   | 2 working days                              | Haematological malignancies                                                 | Bone Marrow (2739)                          |
| D-Dimer                   | Plasma      | Na Citrate      | Blue       | Paeds 1.8ml, adult 2.7ml | 2 Hours                                     | Blood volume to be followed strictly.                                       | Special Hematology (2848)                   |
| DHEA Sulfate              | Serum       | Plain           | Red        | 5 ml                     | 5 working days (Freq of testing is weekly)  | -                                                                           | Endocrine (2846)                            |
| Digoxin                   | Serum       | Plain           | Red        | 5 ml                     | 1 working day                               | -                                                                           | Special Chemistry (2847)/TDM                |
| ds DNA Screen (Crithidia) | Serum       | Plain           | Red        | 5 ml                     | 10 working days (freq of testing is weekly) | -                                                                           | Immunology (2849)                           |
| ds DNA Quantitative       | Serum       | Plain           | Red        | 5 ml                     | 10 working days (freq of testing is weekly) | -                                                                           | Immunology (2849)                           |
| Erythropoietin (EPO)      | Serum       | Plain           | Red        | 5 ml                     | 5 working days (Freq of testing is weekly)  | -                                                                           | Endocrine (2846)/ Special Hematology (2848) |
| ESR                       | Whole Blood | EDTA            | Purple     | 3 ml                     | 2 Hours                                     | Sample to be sent to the laboratory within 2 hours of collection            | Routine Hematology (2229)                   |

| Test name                                  | Sample      | Container       | Cap Colour | Volume                   | Expected TAT                                      | Remarks                                                                                                                                                                                                                                                                                          | Lab (ext no.)                               |
|--------------------------------------------|-------------|-----------------|------------|--------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Extractable Nuclear Antigen (ENA) Screen   | Serum       | Plain           | Red        | 5 ml                     | 10 working days (freq of testing is every 2 week) | -                                                                                                                                                                                                                                                                                                | Immunology (2849)                           |
| Extractable Nuclear Antigen (ENA) Specific | Serum       | Plain           | Red        | 15 ml                    | 10 working days (freq of testing is every 2 week) | Proceed if ENA Screen positive                                                                                                                                                                                                                                                                   | Immunology (2849)                           |
| Everolimus                                 | Whole Blood | EDTA            | Purple     | 3 ml                     | 5 working days (Freq of testing is weekly)        | Clotted sample will be rejected. Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Special Chemistry (2847)                    |
| Fat Globules                               | Faeces      | Plain cup       | -          | Small amount             | 1 working day                                     | -                                                                                                                                                                                                                                                                                                | F&E (2371)                                  |
| Ferritin                                   | Serum       | SST Gel Tube    | Yellow     | 3 ml                     | 1 working day                                     | Clinical information must be provided                                                                                                                                                                                                                                                            | Endocrine (2846)/ Special Hematology (2848) |
| Fibrinogen                                 | Plasma      | Na Citrate      | Blue       | Paeds 1.8ml, adult 2.7ml | 2 Hours                                           | Blood volume to be followed strictly                                                                                                                                                                                                                                                             | Special Hematology (2848)                   |
| FISH CEP X / SRY                           | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml   | 28 days                                           | Sample to be sent to the laboratory before 12.00pm                                                                                                                                                                                                                                               | Cytogenetic (2656)                          |

| Test name                     | Sample      | Container       | Cap Colour | Volume                 | Expected TAT | Remarks                                            | Lab (ext no.)      |
|-------------------------------|-------------|-----------------|------------|------------------------|--------------|----------------------------------------------------|--------------------|
| FISH Cri-Du-Chat Syndrome     | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Di-George Syndrome       | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Miller-Dieker Syndrome   | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Prader-Willi Syndrome    | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Smith-Magenis Syndrome   | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Williams Syndrome        | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Wolf-Hirschhorn Syndrome | Whole Blood | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 28 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH ATM (11q23)              | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH BCL6 breakapart          | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH BCR/ABL                  | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |

| Test name            | Sample      | Container       | Cap Colour | Volume                 | Expected TAT | Remarks                                            | Lab (ext no.)      |
|----------------------|-------------|-----------------|------------|------------------------|--------------|----------------------------------------------------|--------------------|
| FISH CFBF [inv(16)]  | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH cMYC breakapart | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Del (5q31)      | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Del (7q31)      | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH Del (20q12)     | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH DLEU (13q14)    | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH E2A/PBX         | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH FGFR1           | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH IGH breakapart  | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH IGH/BCL2        | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |

| Test name            | Sample      | Container       | Cap Colour | Volume                 | Expected TAT | Remarks                                            | Lab (ext no.)      |
|----------------------|-------------|-----------------|------------|------------------------|--------------|----------------------------------------------------|--------------------|
| FISH IGH/CCND1       | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH IGH/FGFR3       | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH IGH/MAF         | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH IGH/MYC         | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH MLL (11q23)     | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH p53 (17p13)     | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH PDGFRA          | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH PDGFRB          | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH PML/RARA        | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |
| FISH RARA breakapart | Bone Marrow | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days      | Sample to be sent to the laboratory before 12.00pm | Cytogenetic (2656) |

| Test name                           | Sample                                                                                               | Container       | Cap Colour | Volume                 | Expected TAT                               | Remarks                                                                                             | Lab (ext no.)                                  |
|-------------------------------------|------------------------------------------------------------------------------------------------------|-----------------|------------|------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------|
|                                     |                                                                                                      |                 |            |                        |                                            | Sample to be sent to the laboratory before 12.00pm                                                  | Cytogenetic (2656)                             |
| FISH Trisomy 12 (CEP 12)            | Bone Marrow                                                                                          | Lithium Heparin | Green      | Paeds 2 ml, adult 3 ml | 21 days                                    | Sample to be sent to the laboratory before 12.00pm                                                  | Cytogenetic (2656)                             |
| FLT3-ITD / D835 mutation            | Whole blood/<br>Bone marrow                                                                          | EDTA            | Purple     | 3ml                    | 30 working days                            | Tests for in-house samples are ordered by Haemaphatologists. Send sample within 24hrs of collection | MGAL – Molecular (2205)                        |
| Fluid examination                   | Peritoneal (Ascitic) Fluid<br>Pleural Fluid<br>Pericardial Fluid<br>Synovial Fluid<br>Dialysis Fluid | Plain (Sterile) | -          | 2 ml                   | 4 Hours                                    | Send immediately to the lab (within 30 mins)                                                        | F&E (2371)                                     |
| Folate                              | Serum                                                                                                | SST Gel Tube    | Yellow     | 3.5 ml                 | 1 working day                              | Clinical information must be provided                                                               | Endocrine (2846)/<br>Special Hematology (2848) |
| Follicle-stimulating Hormone (FSH)  | Serum                                                                                                | SST Gel Tube    | Yellow     | 3.5 ml                 | 1 working day                              | -                                                                                                   | Endocrine (2846)                               |
| Fragile X (FMR1, AFF2)              | Whole blood                                                                                          | EDTA            | Purple     | 3ml                    | 90 working days                            | Send sample within 24hrs of collection                                                              | MGAL – Molecular (2205)                        |
| Free Light Chain (kappa and lambda) | Serum                                                                                                | Plain           | Red        | 5 ml                   | 1 month (Freq of testing is monthly)       | Clinical information must be provided                                                               | Immunology (2849)                              |
| Fructosamine                        | Serum                                                                                                | Plain           | Red        | 5 ml                   | 5 working days (Freq of testing is weekly) | -                                                                                                   | Special Chemistry (2847)                       |

| Test name                                            | Sample           | Container         | Cap Colour | Volume | Expected TAT                                       | Remarks                                                                                | Lab (ext no.)                |
|------------------------------------------------------|------------------|-------------------|------------|--------|----------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------|
| G6PD Screen                                          | Blood            | EDTA/Filter paper | Purple     | 1 ml   | 1 day                                              | State 'cord blood' or 'venous blood' and sex of patient                                | Special Hematology (2848)    |
| Galactose-1-Phosphate Uridyl Transferase (GPUT/GALT) | Whole blood      | Heparin           | Green      | 3 ml   | 10 working days (Freq of testing is every 2 weeks) | Send sample immediately to the lab. Otherwise, keep sample at 4°C and transport in ice | IEM (2584)                   |
| Gamma Glutamyl Transferase (GGT)                     | Serum            | SST Gel Tube      | Yellow     | 3.5 ml | Routine : 2 Hours<br>STAT : 60 mins                | -                                                                                      | Routine Chemistry (2850)     |
| General IEM (Inborn Errors of Metabolism) Screen     | First pass urine | Plain cup         | -          | 5 ml   | 5 working days (freq of testing is weekly)         | Send sample immediately to the lab. Otherwise, freeze the sample and transport frozen  | IEM (2584)                   |
| Gentamicin                                           | Serum            | Plain             | Red        | 5 ml   | 1 working day                                      | -                                                                                      | Special Chemistry (2847)/TDM |
| Glucose                                              | Plasma           | Fluoride-Oxalate  | Grey       | 3 ml   | Routine : 2 Hours<br>STAT : 60 mins                | -                                                                                      | Routine Chemistry (2850)     |
| Glucose                                              | Fluid            | Plain             | Red        | 1.0 mL | Routine : 2 Hours                                  | -                                                                                      | Routine Chemistry (2850)     |
| Growth Hormone                                       | Serum            | Plain             | Red        | 5 ml   | 5 working days (Freq of testing is Weekly)         | Sample should reach the lab in less than 30 mins                                       | Endocrine (2846)             |
| Haptoglobin                                          | Serum            | Plain             | Red        | 5 ml   | 5 working days (freq of testing is weekly)         | -                                                                                      | Immunology (2849)            |
| HbA1C                                                | Whole Blood      | EDTA              | Purple     | 3 ml   | 1 working day                                      | -                                                                                      | Special Chemistry (2847)     |
| HLA B*1502 Typing                                    | Whole blood      | EDTA              | Purple     | 3ml    | 14 working days                                    | Send sample within 24hrs of collection                                                 | MGAL – HLA (2205)            |

| Test name                                   | Sample                      | Container    | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                            | Lab (ext no.)            |
|---------------------------------------------|-----------------------------|--------------|------------|--------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| HLA B27 Typing                              | Whole blood                 | EDTA         | Purple     | 3ml          | 14 working days                             | Send sample within 24hrs of collection                                                                                                                                             | MGAL – HLA (2205)        |
| HLA Typing Class I/II (Medium resolution)   | Whole blood                 | EDTA         | Purple     | 3 x 3ml      | 14 working days                             | Please print EMR slip, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample (within 24hrs of collection) to the lab | MGAL – HLA (2205)        |
| Homocysteine, Total                         | Plasma                      | EDTA         | Purple     | 3 ml         | 5 working days (Freq of testing is weekly)  | Fasting specimen is preferred. Collect blood in pre-chilled EDTA tube. Send immediately to laboratory on wet ice within 30 minutes                                                 | Special Chemistry (2847) |
| Human Chorionic Gonadotropin (HCG)          | Serum                       | SST Gel Tube | Yellow     | 3.5 ml       | 1 working day                               | -                                                                                                                                                                                  | Endocrine (2846)         |
| Human Chorionic Gonadotropin (HCG)          | Fluid                       | SST Gel Tube | Yellow     | 1 ml         | 1 working day                               | -                                                                                                                                                                                  | Endocrine (2846)         |
| IgH Gene Rearrangements                     | Whole blood/<br>Bone marrow | EDTA         | Purple     | 3ml          | 30 working days                             | Send sample within 24hrs of collection                                                                                                                                             | MGAL – Molecular (2205)  |
| Immunofixation Electrophoresis (IFE), Serum | Serum                       | Plain        | Red        | 5 ml         | 10 working days (freq of testing is weekly) | Clinical information must be provided                                                                                                                                              | Immunology (2849)        |
| Immunofixation Electrophoresis (IFE), Urine | Urine                       | Na azide     | -          | As collected | 10 working days (freq of testing is weekly) | Clinical information must be provided                                                                                                                                              | Immunology (2849)        |
| Immunoglobulin G,A,M                        | Serum                       | Plain        | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                  | Immunology (2849)        |

| Test name                              | Sample      | Container    | Cap Colour | Volume | Expected TAT                               | Remarks                                                                                                                                                           | Lab (ext no.)            |
|----------------------------------------|-------------|--------------|------------|--------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Immunoglobulin A (IgA)                 | Serum       | Plain        | Red        | 5 ml   | 1 working day                              | -                                                                                                                                                                 | Immunology (2849)        |
| Immunoglobulin E (IgE)                 | Serum       | Plain        | Red        | 5 ml   | 1 working day                              | -                                                                                                                                                                 | Immunology (2849)        |
| Immunoglobulin G (IgG), Serum          | Serum       | Plain        | Red        | 5 ml   | 1 working day                              | -                                                                                                                                                                 | Immunology (2849)        |
| Immunoglobulin M (IgM)                 | Serum       | Plain        | Red        | 5 ml   | 1 working day                              | -                                                                                                                                                                 | Immunology (2849)        |
| Insulin                                | Serum       | SST Gel Tube | Yellow     | 3.5 ml | 1 working day                              | Fasting sample should be checked in a fasting sample, during hypoglycemia or as part of a dynamic function test. Sample should reach the lab in less than 30 mins | Endocrine (2846)         |
| Insulin-like Growth Factor – 1 (IGF-1) | Serum       | Plain        | Red        | 5 ml   | 5 working days (Freq of testing is Weekly) | -                                                                                                                                                                 | Endocrine (2846)         |
| JAK2 ex12 mutation                     | Whole blood | EDTA         | Purple     | 3ml    | 60 working days                            | Tests for in-house samples are ordered under JAK2 V617F mutation                                                                                                  | MGAL – Molecular (2205)  |
| JAK2 V617F mutation                    | Whole blood | EDTA         | Purple     | 3ml    | 14 working days                            | Send sample within 24hrs of collection                                                                                                                            | MGAL – Molecular (2205)  |
| Lactate Dehydrogenase (LDH)            | Serum       | SST Gel Tube | Yellow     | 3.5 ml | Routine : 2 Hours<br>STAT : 60 mins        | Avoid prolonged venous stasis                                                                                                                                     | Routine Chemistry (2850) |
| Lactate Dehydrogenase (LDH)            | Fluid       | SST Gel Tube | Yellow     | 1 ml   | Routine : 2 Hours                          | -                                                                                                                                                                 | Routine Chemistry (2850) |

| Test name                                      | Sample                                | Container                                                | Cap Colour | Volume   | Expected TAT                                          | Remarks                                                                                    | Lab (ext no.)                     |
|------------------------------------------------|---------------------------------------|----------------------------------------------------------|------------|----------|-------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------|
| Lactate, CSF                                   | CSF                                   | Plain (Sterile)                                          | -          | 1 ml     | Routine : 2 Hours                                     | If after office hours inform lab (ext 2582/2850). Send sample immediately                  | Routine Chemistry (2850)          |
| Lactate, plasma                                | Plasma                                | Fluoride-Oxalate                                         | Grey       | 3 ml     | Routine : 2 Hours<br>STAT : 60 mins                   | -                                                                                          | Routine Chemistry (2850)          |
| Lead                                           | Whole Blood                           | EDTA (Trace Element Free)                                | Dark Blue  | 5 ml     | 10 working days (Freq of testing is weekly)           | Collect the special tube at Toxicology Lab (6 <sup>th</sup> Floor, Menara Timur)           | Toxicology & Trace Element (2584) |
| Leucocyte Alkaline Phosphatase (LAP) Score     | Peripheral blood / bone marrow smears | Blood - EDTA<br>Bone marrow - Unfixed fresh marrow smear | Purple     | 2 – 3 ml | 2 working days                                        | Fresh, native blood / bone marrow smears should be used                                    | Bone Marrow (2739)                |
| Leukemia/Lymphoma Immunophenotyping –          | Peripheral Blood                      | EDTA                                                     | Purple     | 2 x 3 ml | 5 working days                                        | Appointment required (ext 2739). Refer to profile list for more information                | Bone Marrow (2739)                |
| Leukemia/Lymphoma Immunophenotyping            | CSF                                   | Plain sterile                                            | White      | 2 ml     | 5 working days                                        | Appointment required (ext 2739). Refer to profile list for more information                | Bone Marrow (2739)                |
| Lithium                                        | Serum                                 | Plain                                                    | Red        | 5 ml     | 1 working day                                         | -                                                                                          | Routine Chemistry (2850)          |
| Luteinising Hormone (LH)                       | Serum                                 | SST Gel Tube                                             | Yellow     | 3.5 ml   | 1 working day                                         | -                                                                                          | Endocrine (2846)                  |
| Lymphocyte subsets (CD3, CD4, CD8, CD19, CD56) | Whole blood                           | EDTA                                                     | Purple     | 3 ml     | 3 working days (Freq of testing is every Tue and Fri) | External sample from outside of UMMC should be delivered to the lab by 12pm. (Tue and Fri) | Immunology (2849)                 |

| Test name | Sample      | Container                 | Cap Colour | Volume | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                                        | Lab (ext no.)                     |
|-----------|-------------|---------------------------|------------|--------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Magnesium | Serum       | SST Gel Tube              | Yellow     | 3.5ml  | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                                                                                                              | Routine Chemistry (2850)          |
| Manganese | Whole Blood | EDTA (Trace Element Free) | Dark Blue  | 5 ml   | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (EDTA Trace Element-free) tube at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| Mercury   | Whole Blood | EDTA (Trace Element Free) | Dark Blue  | 5 ml   | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (EDTA Trace Element-free) tube at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |

| Test name              | Sample      | Container | Cap Colour | Volume | Expected TAT                                       | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)             |
|------------------------|-------------|-----------|------------|--------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Methaemoglobin         | Red Cells   | EDTA      | Purple     | 1 ml   | 1 working day                                      | For in-house only. Please consult with Haemaphatologist before request. Sample must reach the lab within 1 hour after blood taken                                                                                                                               | Special Hematology (2848) |
| Methotrexate           | Serum       | Plain     | Red        | 5 ml   | 1 working day                                      | Appointment required for weekends/public holiday (ext: 2847)                                                                                                                                                                                                    | Special Chemistry (2847)  |
| Mitochondrial Ab (AMA) | Serum       | Plain     | Red        | 5 ml   | 10 working days (Freq of testing is every 2 weeks) | -                                                                                                                                                                                                                                                               | Immunology (2849)         |
| MPL ex10 mutation      | Whole blood | EDTA      | Purple     | 3ml    | 60 working days                                    | Tests for in-house samples are ordered under JAK2 V617F mutation                                                                                                                                                                                                | MGAL – Molecular (2205)   |
| MPO/PR3/GBM Antibodies | Serum       | Plain     | Red        | 5 ml   | 5 working days (Freq of testing is every 2 weeks)  | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Immunology (2849)         |

| Test name               | Sample | Container    | Cap Colour | Volume | Expected TAT                                       | Remarks                                                                                                                                                                                                                                                          | Lab (ext no.)            |
|-------------------------|--------|--------------|------------|--------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Mucopolysaccharides     | Urine  | Plain cup    | -          | 10 ml  | 10 working days (Freq of testing is every 2 weeks) | Early morning urine is preferred. Send sample immediately to the lab. Otherwise, freeze the sample and transport frozen                                                                                                                                          | IEM (2584)               |
| Mycophenolic Acid (MPA) | Plasma | EDTA         | Purple     | 3 ml   | 5 working days                                     | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur)  | Special Chemistry (2847) |
| Myositis Profile        | Serum  | Plain        | Red        | 5 ml   | 5 working days                                     | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur)) | Immunology (2849)        |
| Na/K/Cl                 | Serum  | SST Gel Tube | Yellow     | 3.5 ml | Routine : 2 Hours<br>STAT : 45 mins                | -                                                                                                                                                                                                                                                                | Routine Chemistry (2850) |

| Test name                            | Sample            | Container                         | Cap Colour | Volume                          | Expected TAT      | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Lab (ext no.)            |
|--------------------------------------|-------------------|-----------------------------------|------------|---------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Na/K/Cl                              | Fluid             | SST Gel Tube                      | Yellow     | 1 ml                            | Routine : 2 Hours | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Routine Chemistry (2850) |
| Na/K/Cl, Urine 24H                   | Urine 24 hr       | Plain (24 hr)                     | -          | As collected                    | Routine : 2 Hours | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Routine Chemistry (2850) |
| Newborn Screening (newborn 0-7 days) | Dried Blood Spots | Whatmann 903 special filter paper | -          | Fill all the circles with blood | 3 working days    | <p>Collect blood from already fed baby at the age of 48-72 hours. Completely dry the blood spots at room temperature. Place dried filter paper in an individual envelope or plastic bag for transport.</p> <p>Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita &amp; Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur)</p> | IEM (2584)               |

| Test name         | Sample                   | Container             | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                       | Lab (ext no.)                     |
|-------------------|--------------------------|-----------------------|------------|--------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Nickel            | Urine, Random            | Acid washed urine cup | -          | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at JPP and bring EMR slip (with chop 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584) |
| NPM1 mutation     | Whole blood/ Bone marrow | EDTA                  | Purple     | 3ml          | 30 working days                             | Tests for in-house samples are ordered by Haempathologists. Send sample within 24hrs of collection                                                                                                                                            | MGAL – Molecular (2205)           |
| Occult Blood      | Faeces                   | Plain cup             | -          | Small amount | 1 working day                               | Patient must be off from iron supplement for 4 days and free from red meat diet for 3 days prior to collection of faeces                                                                                                                      | F&E (2731)                        |
| Oestradiol        | Serum                    | SST Gel Tube          | Yellow     | 3.5 ml       | 1 working day                               | -                                                                                                                                                                                                                                             | Endocrine (2846)                  |
| Organic Acids     | Urine                    | Plain cup             | -          | 5 ml         | 5 working days (freq of testing is weekly)  | Send sample immediately to the lab to prevent bacterial contamination. Otherwise, freeze the sample and transport frozen                                                                                                                      | IEM (2584)                        |
| Osmolality, Serum | Serum                    | SST Gel Tube          | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                             | Routine Chemistry (2850)          |

| Test name                              | Sample       | Container                                   | Cap Colour | Volume       | Expected TAT                                          | Remarks                                                                                                         | Lab (ext no.)                |
|----------------------------------------|--------------|---------------------------------------------|------------|--------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------|
| Osmolality, Urine                      | Urine random | Plain cup                                   | -          | 5 ml         | Routine : 2 Hours<br>STAT : 60 mins                   | -                                                                                                               | Routine Chemistry (2850)     |
| Osmotic Fragility Test                 | Whole Blood  | Sterile glass bottle with 500 units heparin | Recycle    | 20-22 ml     | 7 working days                                        | Please call ext 2848 to make an appointment. No blood transfusion given to the patient within the last 3 months | Special Hematology (2848)    |
| Paracetamol                            | Serum        | SST Gel Tube                                | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins                   | -                                                                                                               | Routine Chemistry (2850)     |
| Paraquat                               | Urine        | Plain cup                                   | -          | 10 ml        | 3 hours                                               | -                                                                                                               | Special Chemistry (2847)     |
| Parathyroid Hormone (PTH)              | Plasma       | EDTA                                        | Purple     | 3.5 ml       | 1 working day                                         | -                                                                                                               | Endocrine (2846)             |
| Parietal Cell Ab                       | Serum        | Plain                                       | Red        | 5 ml         | 10 working days<br>(Freq of testing is every 2 weeks) | -                                                                                                               | Immunology (2849)            |
| Peripheral Blood Film (PBF) Morphology | Whole Blood  | EDTA                                        | Purple     | 3 ml         | 3 working days                                        | Send sample within 2 hours of collection                                                                        | Routine Hematology (2229)    |
| Phenobarates                           | Serum        | Plain                                       | Red        | 5 ml         | 1 working day                                         | -                                                                                                               | Special Chemistry (2847)/TDM |
| Phenytoin                              | Serum        | Plain                                       | Red        | 5 ml         | 1 working day                                         | -                                                                                                               | Special Chemistry (2847)/TDM |
| Phosphate                              | Serum        | SST Gel Tube                                | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 60 mins                   | -                                                                                                               | Routine Chemistry (2850)     |
| Phosphate , Urine 24H                  | Urine 24 hr  | 6N HCl (24 hr)                              | -          | As collected | Routine : 2 Hours                                     | -                                                                                                               | Routine Chemistry (2850)     |

| Test name                              | Sample                      | Container                                   | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                              | Lab (ext no.)             |
|----------------------------------------|-----------------------------|---------------------------------------------|------------|--------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------|
| PML-RARA detection (bcr1, bcr2, bcr3)  | Whole blood/<br>Bone marrow | EDTA                                        | Purple     | 2 x 3ml      | 30 working days                             | Send sample within 24hrs of collection                                                                               | MGAL – Molecular (2205)   |
| PNH screen (CD59, FLAER)               | Peripheral Blood            | EDTA                                        | Purple     | 3 ml         | 5 working days                              | Appointment required (ext 2739).                                                                                     | Bone Marrow (2739)        |
| Procalcitonin                          | Plasma                      | Lithium Heparin                             | Green      | 3 ml         | 1 working day                               | -                                                                                                                    | Endocrine (2846)          |
| Progesterone                           | Serum                       | SST Gel Tube                                | Yellow     | 3 ml         | 1 working day                               | -                                                                                                                    | Endocrine (2846)          |
| Prolactin                              | Serum                       | SST Gel Tube                                | Yellow     | 3 ml         | 1 working day                               | -                                                                                                                    | Endocrine (2846)          |
| Prostate Specific Antigen (PSA), Total | Serum                       | SST Gel Tube                                | Yellow     | 3.5 ml       | 1 working day                               | -                                                                                                                    | Endocrine (2846)          |
| Prostate Specific Antigen (PSA), Total | Fluid                       | SST Gel Tube                                | Yellow     | 1.0 mL       | 1 Working Day                               | -                                                                                                                    | Endocrine (2846)          |
| Protein C & Protein S activity         | Plasma                      | Na Citrate                                  | Blue       | 1 x 2.7 ml   | 14 working days                             | Blood volume to be followed strictly. Clinical information must be provided. Sample received during office hour only | Special Hematology (2848) |
| Protein Electrophoresis, (CSF)         | CSF                         | Plain (Sterile)                             | -          | 5 ml         | 15 working days (freq of testing is weekly) | Clinical information must be provided                                                                                | Immunology (2849)         |
| Protein Electrophoresis, (Serum)       | Serum                       | Plain                                       | Red        | 5 ml         | 10 working days (freq of testing is weekly) | Clinical information must be provided                                                                                | Immunology (2849)         |
| Protein Electrophoresis, (Urine)       | Urine                       | Na azide (24 hr) (Early morning spot urine) | -          | As collected | 10 working days (freq of testing is weekly) | Clinical information must be provided                                                                                | Immunology (2849)         |

| Test name              | Sample          | Container            | Cap Colour | Volume        | Expected TAT                               | Remarks                                                                                                          | Lab (ext no.)             |
|------------------------|-----------------|----------------------|------------|---------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------|
| Protein                | Serum           | SST Gel Tube         | Yellow     | 3.5 ml        | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                                | Routine Chemistry (2850)  |
| Protein Total, Urine   | Urine 24 hr     | Na azide (24 hr)     | -          | As collected  | Routine : 2 Hours<br>STAT : 60 mins        | -                                                                                                                | Routine Chemistry (2850)  |
| Protein Total          | Fluid           | SST Gel Tube         | Yellow     | 1.0 mL        | Routine : 2 Hours                          | -                                                                                                                | Routine Chemistry (2850)  |
| PT/INR                 | Plasma          | Na Citrate           | Blue       | 1.8 or 2.7 ml | 90 mins                                    | Blood volume to be followed strictly                                                                             | Special Hematology (2848) |
| Pyruvate, blood        | Blood (fasting) | Perchloric acid tube | -          | 2 ml          | 5 working days (freq of testing is weekly) | Collect tube from IEM lab. Send sample in ice. (Protein-free supernatant can be sent in chilled or frozen state) | IEM (2584)                |
| Pyruvate, CSF          | CSF             | Plain, sterile tube  | -          | 1 ml          | 5 working days (freq of testing is weekly) | Send sample in ice                                                                                               | IEM (2584)                |
| Reducing Sugars, stool | Stool           | Plain cup            | -          | As collected  | 5 working days (freq of testing is weekly) | -                                                                                                                | IEM (2584)                |
| Reducing Sugars, Urine | Urine           | Plain cup            | -          | 5 ml          | 5 working days (freq of testing is weekly) | -                                                                                                                | IEM (2584)                |

| Test name          | Sample      | Container                  | Cap Colour | Volume   | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                                                  | Lab (ext no.)                     |
|--------------------|-------------|----------------------------|------------|----------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Renin, Direct      | Plasma      | EDTA                       | Purple     | 2 x 3 ml | 14 working days                             | <p>1. Renin MUST be requested together with Aldosterone – request will be rejected if only any one test is requested. Both tests require a minimum 3ml of blood in EDTA tube and send to the lab within 30 minutes after collection, at room temperature.</p> <p>2. External samples from outside of UMMC should be delivered frozen</p> | Endocrine (2846)                  |
| Reticulocyte count | Whole blood | EDTA                       | Purple     | 3 ml     | Routine: 2 hour<br>STAT : 60 mins           | Send sample within 2 hours of collection                                                                                                                                                                                                                                                                                                 | Routine Hematology (2229)         |
| Rheumatoid Factor  | Serum       | Plain                      | Red        | 5 ml     | 1 working day                               | -                                                                                                                                                                                                                                                                                                                                        | Immunology (2849)                 |
| Salicylate         | Serum       | SST Gel Tube               | Yellow     | 3.5 ml   | Routine : 2 Hours<br>STAT : 60 mins         | -                                                                                                                                                                                                                                                                                                                                        | Routine Chemistry (2850)          |
| Selenium           | Serum       | Plain (Trace Element Free) | Dark Blue  | 5 ml     | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (Plain Trace Element-free) tube at 6 <sup>th</sup> floor IEM/Toxicology Laboratory or 4 <sup>th</sup> Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with stamp 'paid') or official receipt and sample to the lab         | Toxicology & Trace Element (2584) |

| Test name                            | Sample        | Container    | Cap Colour | Volume           | Expected TAT                                       | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)            |
|--------------------------------------|---------------|--------------|------------|------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Seminal Fluid Analysis               | Seminal Fluid | Plain cup    | -          | Entire ejaculate | 5 working days (freq of testing is weekly)         | Patient to make appointment with the Polyclinic Lab (ext 2392).                                                                                                                                                                                                 | Polylab (2392)           |
| Sex Hormone Binding Globulin (SHBG)  | Serum         | SST Gel Tube | Yellow     | 3.5 ml           | 5 working days (Freq of testing is weekly)         | Reflex testing for female with testosterone $\geq$ 0.5 nmol/L                                                                                                                                                                                                   | Endocrine (2846)         |
| Sirolimus                            | Whole Blood   | EDTA         | Purple     | 3 ml             | 5 working days (Freq of testing is weekly)         | Clotted sample will be rejected                                                                                                                                                                                                                                 | Special Chemistry (2847) |
| Smooth Muscle Ab (SMA)               | Serum         | Plain        | Red        | 5 ml             | 10 working days (Freq of testing is every 2 weeks) | -                                                                                                                                                                                                                                                               | Immunology (2849)        |
| Spinal Muscular Atrophy (SMN1, SMN2) | Whole blood   | EDTA         | Purple     | 3ml              | 90 working days                                    | Send sample within 24hrs of collection                                                                                                                                                                                                                          | MGAL – Molecular (2205)  |
| Sulphite Test                        | Urine         | Plain cup    | -          | 5 ml             | 1 working day                                      | Please call lab (ext. 2584) for appointment                                                                                                                                                                                                                     | IEM (2584)               |
| Sweat test for NaCl, conductivity    | Sweat         | -            | -          | -                | 1 working day                                      | Appointment required, please call ext. 2584. Please print EMR slip.                                                                                                                                                                                             | IEM (2584)               |
| Systemic Sclerosis Profile           | Serum         | Plain        | Red        | 5 ml             | 5 working days                                     | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Immunology (2849)        |

| Test name                                   | Sample                   | Container            | Cap Colour | Volume        | Expected TAT                               | Remarks                                                                                                                                                | Lab (ext no.)             |
|---------------------------------------------|--------------------------|----------------------|------------|---------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Tacrolimus (FK 506)                         | Whole Blood              | EDTA                 | Purple     | 3 ml          | 1 working day                              | Clotted sample will be rejected                                                                                                                        | Special Chemistry (2847)  |
| TCRB Gene Rearrangements                    | Whole blood/ Bone marrow | EDTA                 | Purple     | 3ml           | 30 working days                            | Send sample within 24hrs of collection                                                                                                                 | MGAL – Molecular (2205)   |
| Testosterone                                | Serum                    | SST Gel Tube         | Yellow     | 3.5 ml        | 1 working day                              | -                                                                                                                                                      | Endocrine (2846)          |
| Theophylline                                | Serum                    | Plain                | Red        | 5 ml          | 1 working day                              | -                                                                                                                                                      | Special Chemistry (2847)  |
| Thrombin time                               | Plasma                   | Na Citrate           | Blue       | 1.8 or 2.7 ml | 120 mins                                   | Blood volume to be followed strictly                                                                                                                   | Special Hematology (2848) |
| Thyroglobulin                               | Serum                    | Plain                | Red        | 5 ml          | 5 working days (Freq of testing is weekly) | Test is mainly indicated in the monitoring of thyroid cancer after thyroidectomy or ablation therapy. Thyroglobulin Ab (TgAb) should also be requested | Endocrine (2846)          |
| Thyroglobulin Ab (TgAb)                     | Serum                    | Plain                | Red        | 5 ml          | 5 working days (Freq of testing is weekly) | -                                                                                                                                                      | Endocrine (2846)          |
| Thyroid Peroxidase Ab (TPO)                 | Serum                    | Plain                | Red        | 5 ml          | 5 working days (Freq of testing is weekly) | -                                                                                                                                                      | Endocrine (2846)          |
| Thyroid-stimulating hormone (TSH)           | Serum                    | SST Gel Tube / Plain | Yellow     | 3 ml          | 1 working day                              | TAT for neonatal TSH is 24 hour                                                                                                                        | Endocrine (2846)          |
| Thyroid-stimulating hormone (TSH), Neonatal | Cord Blood               | SST Gel Tube / Plain | Yellow     | 3.5 ml        | 1 working day                              | -                                                                                                                                                      | Endocrine (2846)          |

| Test name                               | Sample | Container    | Cap Colour | Volume | Expected TAT                                | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)            |
|-----------------------------------------|--------|--------------|------------|--------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Thyroid Stimulating Immunoglobulin(TSI) | Serum  | Plain        | Red        | 5 ml   | 10 working days(Freq of testing is 2 weeks) | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)         |
| Thyroxine (T4), Free                    | Serum  | SST Gel Tube | Yellow     | 3.5 ml | 1 working day                               | -                                                                                                                                                                                                                                                               | Endocrine (2846)         |
| Total P1NP (P1NP, Total)                | Plasma | EDTA         | Purple     | 3ml    | 5 working days(Freq of testing is weekly)   | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Special Chemistry (2847) |

| Test name                    | Sample      | Container       | Cap Colour | Volume       | Expected TAT                        | Remarks                                                                                                                                                                                                                                                         | Lab (ext no.)            |
|------------------------------|-------------|-----------------|------------|--------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Total Vitamin D              | Serum       | Plain           | Red        | 5 ml         | 1 week (Freq of testing is weekly)  | Please print EMR slip and make payment at Kaunter Bayaran Menara Selatan/Kaunter Bayaran Kompleks Kesihatan Wanita & Kanak - Kanak (KKWK). Please bring EMR slip (with stamp 'paid') and sample to the lab (4th Floor, Bahagian Perubatan Makmal, Menara Timur) | Endocrine (2846)         |
| Tri-iodothyronine (T3), Free | Serum       | SST Gel Tube    | Yellow     | 3.5 ml       | 1 working day                       | -                                                                                                                                                                                                                                                               | Endocrine (2846)         |
| Triglyceride                 | Serum       | SST Gel Tube    | Yellow     | 3.5 ml       | 2 Hours                             | 12 hr fasting sample required                                                                                                                                                                                                                                   | Routine Chemistry (2850) |
| Triglyceride                 | Fluid       | SST Gel Tube    | Yellow     | 1.0 mL       | Routine : 2 Hours                   | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Troponin I                   | Plasma      | Lithium Heparin | Green      | 3 ml         | 60 minutes                          | -                                                                                                                                                                                                                                                               | Endocrine (2846)         |
| Urea                         | Serum       | SST Gel Tube    | Yellow     | 3.5 ml       | Routine : 2 Hours<br>STAT : 45 mins | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Urea                         | Fluid       | SST Gel Tube    | Yellow     | 1.0 mL       | Routine : 2 Hours                   | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Urea, Urine 24H              | Urine 24 hr | Plain (24 hr)   | -          | As collected | Routine : 2 Hours                   | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Uric Acid                    | Serum       | SST Gel Tube    | Yellow     | 3.5 ml       | 2 Hours                             | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |
| Uric Acid                    | Fluid       | SST Gel Tube    | Yellow     | 1.0 mL       | Routine : 2 Hours                   | -                                                                                                                                                                                                                                                               | Routine Chemistry (2850) |

| Test name                                         | Sample       | Container                   | Cap Colour | Volume       | Expected TAT                                       | Remarks                                                      | Lab (ext no.)                     |
|---------------------------------------------------|--------------|-----------------------------|------------|--------------|----------------------------------------------------|--------------------------------------------------------------|-----------------------------------|
| Uric Acid, Urine 24H                              | Urine 24 hr  | Plain (24 hr)               | -          | As collected | 2 Hours                                            | -                                                            | Routine Chemistry (2850)          |
| Urine 5-Hydroxyl Indole Acetic Acid (5HIAA) 24 Hr | Urine        | Glacial acetic acid (24 hr) | -          | As collected | 7 working days (freq of testing is weekly)         | -                                                            | Special Chemistry (2847)          |
| Urine Albumin 24 Hr                               | Urine 24 hr  | Plain (24 Hr)               | -          | As collected | 1 working day                                      | -                                                            | Special Chemistry (2847)          |
| Urine Albumin : Creatinine                        | Urine random | Plain cup                   | -          | As collected | 1 working day                                      | -                                                            | Special Chemistry (2847)          |
| Urine Analysis (Urine FEME)                       | Urine        | Plain cup                   | -          | 10 ml        | 2 Hours (STAT:45 mins)                             | Specimen received >3 hours after collection will be rejected | F&E (2731)/ Polylab (2392)        |
| Urine Cannabinoids                                | Urine        | Plain cup                   | -          | 10 ml        | 1 working day                                      | Only for samples from Psychiatry and Staff Health Clinic     | Special Chemistry (2847)          |
| Urine Catecholamines 24 Hr                        | Urine 24 hr  | 6N HCl (24 hr)              | -          | As collected | 14 working days                                    | -                                                            | Special Chemistry (2847)          |
| Urine Metanephrines 24 Hr                         | Urine        | 6N HCl (24 hr)              | -          | As collected | 14 working days (Freq of testing is every 2 weeks) | -                                                            | Special Chemistry (2847)          |
| Urine Opiates                                     | Urine        | Plain cup                   | -          | 10 ml        | 1 working day                                      | Only for samples from Psychiatry and Staff Health Clinic     | Special Chemistry (2847)          |
| Urine Porphobilinogen                             | Urine        | Plain cup                   | -          | 10ml         | 7 calendar days                                    | Please covered with aluminum foil                            | F&E (2371)                        |
| Urine Pregnancy Test (UPT)                        | Urine        | Plain cup                   | -          | 2 ml         | 2 hours                                            | First morning or random specimen                             | F&E (2731)/ Polylab (2392)        |
| Urine Toxicology Screen                           | Urine        | Plain cup                   | -          | 20 ml        | 10 working days (Freq of testing is weekly)        | -                                                            | Toxicology & Trace Element (2584) |
| Urine Vanillylmandelic Acid (VMA) Screen          | Urine        | 6N HCL random or 24 hr      | -          | As collected | 5 working days (Freq of testing is weekly)         | -                                                            | Special Chemistry (2847)          |
| Valporic acid                                     | Serum        | Plain                       | Red        | 5 ml         | 1 working day                                      | -                                                            | Special Chemistry (2847/TDM)      |

| Test name                 | Sample      | Container                           | Cap Colour | Volume       | Expected TAT                                | Remarks                                                                                                                                                                                                                                                                                                  | Lab (ext no.)                               |
|---------------------------|-------------|-------------------------------------|------------|--------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Vancomycin                | Serum       | Plain                               | Red        | 5 ml         | 1 working day                               | -                                                                                                                                                                                                                                                                                                        | Special Chemistry (2847/TDM)                |
| Vitamin B12 and Folate    | Serum       | SST Gel Tube                        | Yellow     | 3 ml         | 1 working day                               | Clinical information must be provided                                                                                                                                                                                                                                                                    | Endocrine (2846)/ Special Hematology (2848) |
| Von Willebrand : Antigen  | Plasma      | Na Citrate                          | Blue       | 2.7 ml       | 14 working days                             | Blood volume to be followed strictly                                                                                                                                                                                                                                                                     | Special Hematology (2848)                   |
| Von Willebrand : Activity | Plasme      | Na Citrate                          | Blue       | 2.7 ml       | 14 working days                             | Blood volume to be followed strictly                                                                                                                                                                                                                                                                     | Special Hematology (2848)                   |
| Zinc, Serum               | Serum       | Plain ( <b>Trace Element Free</b> ) | Dark Blue  | 5 ml         | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect the special (Plain Trace Element-free) tube at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with stamp 'paid') or official receipt and sample to the lab | Toxicology & Trace Element (2584)           |
| Zinc, Urine               | Urine 24 hr | Acid washed urine bottle            |            | As collected | 10 working days (Freq of testing is weekly) | Please print EMR slip, collect urine bottle at 6th floor IEM/Toxicology Laboratory or 4th Floor, Bahagian Perubatan Makmal, Menara Timur, make payment at Jabatan Pembangunan Perniagaan and bring EMR slip (with stamp 'paid') or official receipt and sample to the lab                                | Toxicology & Trace Element (2584)           |

### PROFILES AND PACKAGES

The following lists profiles/packages specifically grouped for ease of ordering and reference for Chemistry, Immunology, Endocrine and Haematology. The profiles/packages also include additional comments and some common indications/utilizations.

| Description<br>(Profile Name)                      | Tests Component                                                                                                                                                                                                                                                                              | Specimen Requirement                   | Expected TAT                       | Remarks                                                                                                                                                                                               |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Complete Blood Count (CBC)                         | Hb, Hematocrit, RBC, MCV, MCH, MCHC, RDW, Platelet, WBC                                                                                                                                                                                                                                      | EDTA 3 ml                              | Routine : 2 hours<br>STAT: 45 mins | Ensure adequate mixing of blood and send within 2hr of collection                                                                                                                                     |
| Complete Blood Count (CBC) with differential count | Hb, Hematocrit, RBC, MCV, MCH, MCHC, RDW, Platelet, WBC, Differential count                                                                                                                                                                                                                  | EDTA 3 ml                              | Routine : 2 hours<br>STAT: 60 mins | Ensure adequate mixing of blood and send within 2hr of collection                                                                                                                                     |
| Bone Marrow Aspirate, Full work-up                 | Routine Stains (MGG, Perox, Perl's Iron stain), Tests upon request by Haemaphatologist: Special Stains (NSE, LAP, PAS), Immunophenotyping, Conventional Cytogenetic (Haematological Malignancy), FISH tests, Molecular Tests (ALL Screen, AML Screen, FLT3-ITD/D835 Mutation, NPM1 Mutation) | Slides, EDTA x3 and Lithium Heparin x1 | 21 days                            | Investigation for haematological disorders/malignancies. New cases will require both marrow & trephine biopsy                                                                                         |
| Bone Marrow Aspirate, Follow-up                    | Routine Stain (MGG, Perox, Perl's Iron stain) Tests upon request by Haemaphatologist: Special Stains (NSE, LAP, PAS), Immunophenotyping,                                                                                                                                                     | Slides, EDTA x2                        | 5 working days                     | Investigation for haematological disorders/malignancies. Follow up cases will require a marrow aspirate except for aplastic anaemia or secondaries in marrow, which require a trephine biopsy as well |
| CKD (Simple)                                       | CBC, RFT, Alb, Ca, P, ALP, UFEME                                                                                                                                                                                                                                                             | SST gel tube, Urine Cup                | 1 working day                      | -                                                                                                                                                                                                     |
| CKD (Complete)                                     | CBC, RFT, LFT, Ca, P, Uric Acid, Lipid, Glu, PTH, HbA1C, UFEME, urine protein creatinine ratio                                                                                                                                                                                               | EDTA x 2, SST gel tube, Urine Cup      | 1 working day                      | -                                                                                                                                                                                                     |

| Description (Profile Name)            | Tests Component                                                          | Specimen Requirement                         | Expected TAT  | Remarks                                                                                                                                    |
|---------------------------------------|--------------------------------------------------------------------------|----------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Creatinine Clearance                  | Serum Creatinine and urine creatinine 24 Hour                            | SST Gel tube, 24hr Plain Urine               | 1 working day | Ensure adequate hydration of patient and complete collection of 24 hr urine. <b>Urine and blood samples MUST be sent together</b>          |
| <i>Dexamethasone Suppression Test</i> | Serum and Urine Cortisol - Basal and Post-Dexamethasone                  | SST gel tube, Urine Cup                      | 1 working day | Dynamic Function Test, Please consult Endocrine Specialist                                                                                 |
| Diabetic Annual Check                 | CBC, RFT, Uric Acid, Lipids, Glu, Urine FEME, Urine ACR, HbA1c, LFT, AST | SST Gel tube, Fluoride tube, Urine cup, EDTA | 1 working day | -                                                                                                                                          |
| Dialysis Package 1                    | CBC, Iron Studies, RFT, PTH, LFT, Lipid, Ca, P, Glu, CRP, HbA1C          | EDTA x 2, SST gel tube, Plain Tube           | 1 working day | -                                                                                                                                          |
| Dialysis Package 2                    | CBC, Iron Studies, RFT, LFT, Lipid, CRP, Ca, P, Glu                      | EDTA, SST gel tube, Plain Tube               | 1 working day | -                                                                                                                                          |
| DIVC Screen                           | PT/APTT/TT/Fibrinogen/D Dimer Qualitative                                | Na Citrate tube Paeds 1.8ml, Adult 2.7ml     | 2 hours       | Blood volume must be followed strictly. Clinical information must be provided                                                              |
| Glucose Suppression Test              | GH & Glucose at 0, 60, 120 minutes                                       | Plain Tube x 3<br>Fluoride Tube x 3          | 1 working day | 1) Dynamic Function Test, Please consult Endocrine Specialist<br>2) All specimens shall be sent together to the lab to ease interpretation |
| GnRH Test                             | FSH & LH at 0, 30, 60 minutes                                            | SST gel tube x 3                             | 1 working day | 1) Dynamic Function Test, Please consult Endocrine Specialist<br>2) All specimens shall be sent together to the lab to ease interpretation |

| Description (Profile Name)                                | Tests Component                                             | Specimen Requirement                               | Expected TAT    | Remarks                                                                                                                                                                                                                               |
|-----------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Haemophilia Screen                                        | APTT, Factor VIII, Factor IX                                | Na Citrate x 2                                     | 7 working days  | Investigation of bleeding tendency associated ONLY with prolonged APTT. Blood volume must be followed strictly. Clinical information must be provided                                                                                 |
| Immunology Screen                                         | C3, C4, ANF, dsDNA Ab, RF                                   | Plain Tube                                         | 10 working days | -                                                                                                                                                                                                                                     |
| Insulin Tolerance Test                                    | Cortisol, GH, Glucose at 0, 15, 30, 45, 60, 90, 120 minutes | Plain Tube x7<br>Fluoride Tube x7                  | 5 working days  | 1) Dynamic Function Test, Please consult Endocrine Specialist<br>2) All specimens shall be sent together to the lab to ease interpretation                                                                                            |
| Iron Studies                                              | Iron, Ferritin, Transferrin, Transferrin saturation         | Plain Tube                                         | 1 working day   | Clinical information must be provided                                                                                                                                                                                                 |
| Lipid Profile                                             | TG, T Chol, HDL Chol, LDL Chol                              | SST Gel tube                                       | 2 hours         | 12 hr fasting sample required                                                                                                                                                                                                         |
| Liver Function Tests (LFT)                                | Alb, T bili, ALT, ALP, GGT                                  | SST Gel tube                                       | 2 hours         | -                                                                                                                                                                                                                                     |
| Lupus Anticoagulant Screen                                | APTT, Silica clotting time, LA screen, LA confirm           | Na Citrate 2.7ml x 2<br>or<br>Na Citrate 1.8ml x 3 | 14 working days | Investigation of patients with suspected thrombosis, antiphospholipid (APL) syndrome and recurrent abortions. Blood volume must be followed strictly. Clinical information must be provided. Samples received during office hour only |
| Lymphocyte Subset quant – CD4/CD8                         | CD3, CD4, CD8                                               | EDTA tube                                          | 3 working days  | -                                                                                                                                                                                                                                     |
| Lymphocyte subset quant – full (B-cell and T-cell Subset) | CD3, CD4, CD8, CD19, CD56                                   | EDTA tube                                          | 3 working days  | -                                                                                                                                                                                                                                     |
| Oral GTT                                                  | Glucose 2 points                                            | Fluoride tube x 2                                  | 1 working day   | Proper patient selection and preparation required. See Special Test Procedures                                                                                                                                                        |

| Description (Profile Name)   | Tests Component                                                                        | Specimen Requirement                               | Expected TAT    | Remarks                                                                                                                                                                                                                          |
|------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phosphate (TMP-GFR)          | Serum creatinine, serum phosphate, urine creatinine (random), urine phosphate (random) | SST gel tube, Urine Cup                            | 1 working day   | -                                                                                                                                                                                                                                |
| Platelet Function Test       | Bleeding Time, Platelet Aggregation Studies                                            | Na Citrate x 5<br>EDTA x 1                         | 5 working days  | Investigation of bleeding tendency associated with <u>normal</u> platelet count & coagulation screen results.<br>Appointment required (ext. 2848). Blood volume must be followed strictly. Clinical information must be provided |
| Renal Function Tests (RFT)   | Na, K, Cl, HCO <sub>3</sub> , Urea, Crea, AGAP                                         | SST Gel tube                                       | 2 hours         | -                                                                                                                                                                                                                                |
| Renal Transplant             | CBC Diff, RFT, LFT, Ca, P, Urine FEME                                                  | EDTA, SST gel tube, Urine Cup                      | 3 hours         | -                                                                                                                                                                                                                                |
| SynacthenTest                | Cortisol at 0, 30, 60 minutes                                                          | Plain Tube x 3                                     | 1 working day   | 1) Dynamic Function Test, Please consult Endocrine Specialist<br>2) All specimens shall be sent together to the lab to ease interpretation                                                                                       |
| Thrombophilia Study          | Antithrombin, Protein C, Protein S, APCR                                               | Na Citrate 2.7ml x 2<br>or<br>Na Citrate 1.8ml x 3 | 14 working days | Blood volume must be followed strictly. Clinical information must be provided                                                                                                                                                    |
| Thalassaemia Screen          | CBC, Retic, HbH, HbEP (standard), HbA2, HbF.                                           | EDTA 3 ml                                          | 14 working days | Investigation of patients with suspected haemoglobinopathy or Thalassaemia                                                                                                                                                       |
| Bone Marrow Trepine Biopsy   | Haematoxylin, Eosin, Reticulin, AFB, Fungal, Immunohistochemical stains.               | Formalin tube                                      | 14 working days | Staging of malignancies with propensity for bony metastasis, both marrow and trephine biopsy is mandatory                                                                                                                        |
| Von Willebrand Disease Study | APTT, FVIII, vWF Ag, vWF Activity                                                      | Na Citrate tube x 2                                | 14 working days | Blood volume must be followed strictly. Clinical information must be provided                                                                                                                                                    |

### REFERENCE RANGES

The reference ranges given here are for adults unless otherwise indicated. These ranges given are only to be used as a guide and may change from time to time. Please refer to the result report for the current reference range or if a range is not given.

| TEST NAME                                    | SAMPLE               | REFERENCE RANGE                                                                                                                            |
|----------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 17-OH Progesterone                           | Serum                | Males<50years: 0.97-10.1 nmol/L<br>Males>50 years: 1.2-7.2 nmol/L<br>Females<50years: 1.1-12.5 nmol/L<br>Females>50 years: 0.97-8.2 nmol/L |
| Urine 5- Hydroxyl Indole Acetic Acid (5HIAA) | Urine                | < 6.0 mmol/mol creat                                                                                                                       |
| Acetylcholine Receptor Antibody (AChR)       | Serum                | Normal: <0.04 nmol/L<br>Bordeline: 0.40 - 0.49<br>Positive: >= 0.50 nmol/L                                                                 |
| Activated Protein C Resistance (APCR)        | Plasma               | >2.22                                                                                                                                      |
| Adrenocorticotrophic Hormone (ACTH)          | Plasma               | 0 – 46 pg/mL                                                                                                                               |
| Alanine Aminotransferase (ALT)               | Serum                | 10-49 U/L                                                                                                                                  |
| Albumin                                      | Serum<br>Fluid       | 32-48 g/L<br>NA                                                                                                                            |
| Aldosterone                                  | Serum                | Supine: 102 – 859 pmol/L<br>Upright: 102 – 1197 pmol/L                                                                                     |
| Alkaline Phosphatase                         | Serum                | 0-12 yrs : 54 – 369 U/L<br>>12 yrs : 45 – 129 U/L                                                                                          |
| Allergy Testing 54 Allergens                 | Serum                | Negative: < 5<br>Borderline: 6-10<br>Positive: 11-50<br>Strong Positive: >50                                                               |
| Alpha-1 Antitrypsin (AAT)                    | Serum                | 90 – 200 mg/dL                                                                                                                             |
| Alpha-Fetoprotein (AFP)                      | Serum<br>Fluid       | 0 – 6.7 IU/mL<br>NA                                                                                                                        |
| Aluminium                                    | Serum                | Adult: < 0.4 umol/L<br>Chronic Kidney Disease: < 2.20 umol/L                                                                               |
| Aluminium                                    | Urine                | 24 hr urine: 0.2 - 2.0 umol/day<br>Random urine: 5.0 - 70.0 nmol/mmol creatinine                                                           |
| Amino Acids                                  | Blood, CSF,<br>urine | Refer to report                                                                                                                            |
| Ammonia                                      | Plasma               | 11.2-35.4 umol/L                                                                                                                           |
| Amphetamine/Methamphetamine                  | Urine                | Negative                                                                                                                                   |
| Amylase                                      | Serum<br>Fluid       | 30 – 118 U/L<br>NA                                                                                                                         |
| Amylase (Urine random)                       | Urine<br>random      | 0 - 650 U/L                                                                                                                                |

| TEST NAME                                       | SAMPLE         | REFERENCE RANGE                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Anticardiolipin Ab                              | Serum          | < 20 units                                                                                                                                                                                                                                                                                                                                                                             |
| Anti-CCP                                        | Serum          | < 7.4 U/mL                                                                                                                                                                                                                                                                                                                                                                             |
| Anti-Mullerian Hormone                          | Serum          | <p>Healthy Women:</p> <p>20 - 24 years      10.9 - 71.0 pmol/L</p> <p>25 - 29 years      8.57 - 64.6 pmol/L</p> <p>30 - 34 years      5.08 - 54.2 pmol/L</p> <p>35 - 39 years      2.89 - 49.7 pmol/L</p> <p>40 - 44 years      0.421 - 31.7 pmol/L</p> <p>45 - 50 years      0.071 - 12.8 pmol/L</p> <p>PCOS Women      17.2 - 122 pmol/L</p> <p>Healthy Men : 10.2 – 82.8 pmol/L</p> |
| Anti-Neutrophilic Cytoplasmic Antibodies (ANCA) | Serum          | Negative                                                                                                                                                                                                                                                                                                                                                                               |
| Antinuclear Ab (ANF)                            | Serum          | Negative                                                                                                                                                                                                                                                                                                                                                                               |
| Antistreptolysin-O (ASO)                        | Serum          | < 408 IU/mL                                                                                                                                                                                                                                                                                                                                                                            |
| Anti-thrombin III                               | Plasma         | 83 - 128 %                                                                                                                                                                                                                                                                                                                                                                             |
| APTT (activated partial thromboplastin time)    | Plasma         | 28.0 - 40.3 sec (changes with reagent lot. Refer to range given with result)                                                                                                                                                                                                                                                                                                           |
| Arsenic                                         | Urine          | 24 hr urine: < 1.5 umol/day<br>Random urine: < 90 nmol/mmol creatine                                                                                                                                                                                                                                                                                                                   |
| Aspartate Aminotransferase (AST)                | Serum          | < 34 U/L                                                                                                                                                                                                                                                                                                                                                                               |
| Beta-CrossLaps                                  | Plasma         | <p>Males:</p> <p>25–70 years: 100 – 600</p> <p>&gt;70 years: 100 – 750</p> <p>Females:</p> <p>Premenopausal</p> <p>20–49 years: 150 – 800</p> <p>Menopausal</p> <p>50–70 years: 50 – 800</p>                                                                                                                                                                                           |
| B2-Microglobulin (BMG), Serum                   | Serum          | ≤ 2.5 mg/L                                                                                                                                                                                                                                                                                                                                                                             |
| B2-Microglobulin (BMG), Urine                   | Urine          | ≤ 0.3 mg/L                                                                                                                                                                                                                                                                                                                                                                             |
| Bence Jones Protein                             | Urine          | Negative                                                                                                                                                                                                                                                                                                                                                                               |
| Bile Acids, Total                               | Serum          | A well-defined local reference range for serum bile acids is not available. Serum bile acids levels >40 umol/L in pregnancy is considered as markedly high.                                                                                                                                                                                                                            |
| Bicarbonate                                     | Serum          | 20 – 31 mmol/L                                                                                                                                                                                                                                                                                                                                                                         |
| Bilirubin, Conjugated                           | Serum          | < 5.1 umol/L                                                                                                                                                                                                                                                                                                                                                                           |
| Bilirubin, Total                                | Serum<br>Fluid | < 17 umol/L<br>NA                                                                                                                                                                                                                                                                                                                                                                      |

| TEST NAME                        | SAMPLE                                | REFERENCE RANGE                                                                                                                                                                                                                    |
|----------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bleeding Time                    | Whole Blood                           | 1 – 5 minutes                                                                                                                                                                                                                      |
| <b>Blood Gases</b>               | Whole Blood, arterial                 | pH 7.36 – 7.44<br>pCO <sub>2</sub> 35 - 45mmHg<br>pO <sub>2</sub> 80 - 100mmHg<br>BE (-2) – 3<br>Bicarb 21 – 28 mmol/l                                                                                                             |
| Blood Gases                      | Whole Blood, venous                   | pH 7.32 - 7.43<br>pCO <sub>2</sub> 40 - 50mmHg<br>pO <sub>2</sub> 25 -40mmHg<br>Bicarb 23-29 mmol/L                                                                                                                                |
| Bone Marrow Examination          | Bone Marrow Aspirate / Trepine Biopsy | Refer to report                                                                                                                                                                                                                    |
| B-type Natriuretic Peptide (BNP) | Plasma                                | < 100pg/ml                                                                                                                                                                                                                         |
| CA 125                           | Serum Fluid                           | 0 – 30 U/ml<br>NA                                                                                                                                                                                                                  |
| CA 15-3                          | Serum Fluid                           | <32.4 U/ml<br>NA                                                                                                                                                                                                                   |
| CA 19-9                          | Serum Fluid                           | <37.0 U/ml<br>NA                                                                                                                                                                                                                   |
| Cadmium                          | Blood                                 | Occupational Exposure: 0 - 90.0 nmol/L<br>Non-smokers: < 30 nmol/L<br>Smokers: < 54 nmol/L                                                                                                                                         |
| Cadmium                          | Urine                                 | Random urine: < 1.0 nmol/mmol creatinine                                                                                                                                                                                           |
| Caeruloplasmin                   | Serum                                 | 0.20– 0.60 g/L                                                                                                                                                                                                                     |
| Calcium                          | Serum                                 | 2.2 – 2.6 mmol/L                                                                                                                                                                                                                   |
| Calcium (Urine 24 H)             | Urine 24 hr                           | 2.2– 7.5 mmol/24H                                                                                                                                                                                                                  |
| Calprotectin                     | Stool                                 | <50 ug/g -Not indicate of inflammation in the GIT<br>50-200 ug/g- Mild organic disease such as inflammation, mild diverticulitis, IBD in remission.<br>>200 ug/g - Indicate of active organic disease with inflammation in the GIT |
| Cannabinoids Screen              | Urine                                 | Negative                                                                                                                                                                                                                           |
| Carcinoembryonic Antigen (CEA)   | Serum Fluid                           | 0 – 2.5 ng/mL<br>NA                                                                                                                                                                                                                |

| TEST NAME                                                                     | SAMPLE         | REFERENCE RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catecholamines                                                                | Urine 24 hr    | Adrenaline 9.2 – 122.3 nmol/24H<br>Noradrenaline 71.5 – 505.3 nmol/24H<br>Dopamine 0 – 3237 nmol/24H                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Chloride                                                                      | Serum          | 99 – 109 mmol/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Cholesterol, HDL                                                              | Serum          | > 1.1 mmol/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Cholesterol, LDL                                                              | Serum          | < 2.59 mmol/L (NCEP)*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Cholesterol, Total                                                            | Serum<br>Fluid | < 5.2 mmol/L (desirable)<br>NA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Cholinesterase                                                                | Serum          | 4900 – 11,900 U/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Chromium                                                                      | Serum          | Normal: < 11.5 nmol/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Chromium                                                                      | Urine          | Random urine: < 1.0 nmol/mmol creatinine                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| CKMB Mass                                                                     | Serum          | < 5.0 ug/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Coagulation Factors Assay<br><br>(FII, FV, FVII, FVIII, FIX, FX, FXI or FXII) | Plasma         | FII : 79 - 131%<br>FV : 62 - 139%<br>FVII : 50 - 129%<br>FVIII : 50 - 150%<br>FIX : 65 - 150%<br>FX : 77 - 131%<br>FXI : 65 - 150%<br>FXII : 50 - 150%                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Complement 3 (C3)                                                             | Serum          | 90-180 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Complement 4 (C4)                                                             | Serum          | 10-40 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Complete Blood Count (CBC)                                                    | Whole<br>Blood | Hb (Male) 130 – 170 g/L, (Female) 120 – 150<br>g/L<br>Hct (Male) 0.40 – 0.50 l/l, (Female) 0.36 –<br>0.46 l/l<br>RBC (Male) 4.5 – 5.5, (Female) 3.8 – 4.8<br>x10 <sup>12</sup> /L<br>MCV 77 – 97 fl<br>MCH 27 – 32 pg<br>MCHC 315– 345 g/L<br>WBC 4 – 10 x10 <sup>9</sup> /L<br>Plt 150 – 400 x10 <sup>9</sup> /L<br>Reticulocyte 0.5-2.5 %<br>Neutrophils 2.0 - 7.0 x 10 <sup>9</sup> /L<br>Lymphocytes 1.0 - 3.0 x 10 <sup>9</sup> /L<br>Eosinophil 0.02- 0.5 x10 <sup>9</sup> /L<br>Monocytes 0.2 - 1.0 x 10 <sup>9</sup> /L<br>Basophil 0.02 - 0.1 x 10 <sup>9</sup> /L |

| TEST NAME                                            | SAMPLE                | REFERENCE RANGE                                                                                                                                                                                                                       |
|------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conventional Cytogenetics (Genetics)                 | Whole Blood           | Male : 46,XY<br>Female : 46,XX                                                                                                                                                                                                        |
| Conventional Cytogenetics (Hematological Malignancy) | Bone Marrow           | Refer to report                                                                                                                                                                                                                       |
| Copper                                               | Serum                 | 11 – 22 umol/L                                                                                                                                                                                                                        |
| Copper                                               | Urine 24 hr or random | 24 hr urine: < 1.0 umol/day<br>Random: < 0.1 umol/mmol creatinine                                                                                                                                                                     |
| Cortisol                                             | Serum                 | 7-9am: 145 – 619 nmol /L<br>3-5pm: 95 – 462 nmol /L                                                                                                                                                                                   |
| Cortisol                                             | Urine                 | 57.7 – 806.8 nmol /24H                                                                                                                                                                                                                |
| C-Peptide                                            | Serum                 | 0.9 – 7.1 ng/mL (Fasting)                                                                                                                                                                                                             |
| C-Reactive Protein (CRP)                             | Serum                 | < 5.00 mg/L                                                                                                                                                                                                                           |
| C-Reactive Protein, Hypersensitive (hsCRP)           | Serum                 | NA                                                                                                                                                                                                                                    |
| Creatine Kinase                                      | Serum                 | Males 46-171 U/L<br>Females 34-145 U/L                                                                                                                                                                                                |
| Creatinine                                           | Serum                 | Males 54 – 97 umol/L<br>Females 44 – 71 umol/L                                                                                                                                                                                        |
|                                                      | Fluid                 | NA                                                                                                                                                                                                                                    |
| Creatinine (Urine)                                   | Urine 24 hr           | 7 – 18 mmol/24H                                                                                                                                                                                                                       |
| Cryoglobulin                                         | Serum                 | Refer to report                                                                                                                                                                                                                       |
| CSF FEME                                             | CSF                   | Refer to report                                                                                                                                                                                                                       |
| Cytospin                                             | CSF                   | Refer to report                                                                                                                                                                                                                       |
| D-Dimer                                              | Plasma                | Negative (< 200 ng/mL)                                                                                                                                                                                                                |
| Dehydroepiandrosterone Sulfate (DHEA-S)              | Serum                 | Males 2.2 – 15.2 umol/L<br>Females 0.9 – 11.7 umol/L                                                                                                                                                                                  |
| ds-DNA Ab Quantitation                               | Serum                 | < 200 IU/mL                                                                                                                                                                                                                           |
| ds-DNA Ab Screen                                     | Serum                 | Negative                                                                                                                                                                                                                              |
| Erythropoietin(EPO)                                  | Serum                 | 4.3 - 29 IU/L                                                                                                                                                                                                                         |
| ESR                                                  | Whole Blood           | Male < 21 mm/hr<br>Female < 29 mm/h                                                                                                                                                                                                   |
| Estradiol                                            | Serum                 | <b>Males</b> : ND - 146 pmol/L<br><br><b>Menstruating Female</b> :<br>Follicular Phase 72 - 529 pmol/L<br>Midcycle 235 - 1309 pmol/L<br>Luteal Phase 205 – 786 pmol/L<br><b>Post Menopausal Female</b> (untreated)<br>ND - 118 pmol/L |

| TEST NAME                                 | SAMPLE                    | REFERENCE RANGE                                                                                                                                                                                                                                                        |
|-------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Everolimus                                | Whole Blood               | 3-8 ng/ml                                                                                                                                                                                                                                                              |
| Extractable Nuclear Antigen (ENA)         | Serum                     | Negative                                                                                                                                                                                                                                                               |
| Fat Globules                              | Faeces                    | Negative                                                                                                                                                                                                                                                               |
| Ferritin                                  | Serum                     | Males 22.0 – 322.0 ug/L<br>Females 10.0 – 291.0 ug/L                                                                                                                                                                                                                   |
| Fibrinogen                                | Plasma                    | 1.78 – 3.96 g/L                                                                                                                                                                                                                                                        |
| Fluid FEME                                | Fluid                     | Refer to report                                                                                                                                                                                                                                                        |
| Fluorescence in situ hybridization (FISH) | Whole Blood / Bone marrow | Refer to report                                                                                                                                                                                                                                                        |
| Folate                                    | Serum                     | >12.19 nmol/L                                                                                                                                                                                                                                                          |
| Follicular Stimulating Hormone (FSH)      | Serum                     | <b>Males</b><br>13 – 70yr: 1.4 – 18.1 IU/L<br><br><b>Menstruating Females :</b><br>Follicular Phase: 2.5 – 10.2 IU/L<br>Midcycle Peak: 3.4 – 33.4 IU/L<br>Luteal Phase: 1.5 – 9.1 IU/L<br>Pregnant: < 0.3 IU/L<br><br><b>Post Menopausal Female</b><br>23.0 – 116 IU/L |
| Free Light Chain Kappa & Lambda           | Serum                     | Kappa: 6.7-22.4 mg/L<br>Lambda: 8.3-27.0 mg/L<br>Kappa/Lambda Ratio: 0.26-1.65                                                                                                                                                                                         |
| Fructosamine                              | Serum                     | 205-285 umol/L                                                                                                                                                                                                                                                         |
| Gamma Glutamyl Transferase (GGT)          | Serum                     | Males : < 73 IU/L<br>Females : <38 IU/L                                                                                                                                                                                                                                |
| Glucose                                   | Plasma<br><br>Fluid       | < 5.6 mmol/L (Fasting)<br>< 7.8 mmol/L (Random)<br>< 11.1 mmol/L (Postprandial)<br>NA                                                                                                                                                                                  |
| Growth Hormone                            | Serum                     | Males: < 3 ng/mL<br>Females: < 8 ng/mL                                                                                                                                                                                                                                 |
| Haptoglobin                               | Serum                     | 30 – 200 mg/dL                                                                                                                                                                                                                                                         |
| HbA1C                                     | Whole Blood               | < 6.5% (NGSP)<br>< 48 mmol/mol (IFCC)                                                                                                                                                                                                                                  |
| Human Chorionic Gonadotropin (HCG)        | Serum<br><br>Fluid        | Premenopausal Females:<br><6 IU/L<br>Postmenopausal Females:<br><10 IU/L<br>Males: <2 IU/L<br><br>NA                                                                                                                                                                   |

| TEST NAME                              | SAMPLE | REFERENCE RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Immunoglobulin A (IgA)                 | Serum  | 70 – 400 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Immunoglobulin E (IgE)                 | Serum  | ≤ 165 IU/mL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Immunoglobulin G (IgG)                 | Serum  | 700 – 1600 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                        | CSF    | 2.0 – 4.0 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Immunoglobulin M (IgM)                 | Serum  | 40 - 230 mg/dL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Insulin                                | Serum  | 3.0 - 25.0 mU/L(Fasting)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Insulin-like Growth Factor - 1 (IGF-1) | Serum  | Age(Y): Reference ranges<br>Male:<br>0-3 :15.0 - 129 ng/mL<br>4-6: 22 - 208 ng/mL<br>7-9: 40.1 - 255 ng/mL<br>10-11: 68.7 -316 ng/mL<br>12-13: 143-506 ng/mL<br>14-15: 177-507 ng/mL<br>16-18: 173-414 ng/mL<br>Female:<br>0-3: 18.2- 172 ng/mL<br>4-6: 35.4-232 ng/mL<br>7-9: 56.9-277 ng/mL<br>10-11: 118-448 ng/mL<br>12-13: 170-527 ng/mL<br>14-15: 191-496 ng/mL<br>16-18: 190-429 ng/mL<br>Adult<br>19-21: 117-323 ng/mL<br>22-24: 98.7- 289 ng/mL<br>25-29: 83.6-259 ng/mL<br>30-34: 71.2-234 ng/mL<br>35-39: 63.4-223 ng/mL<br>40-44: 58.2 -219ng/mL<br>45-49: 53.3-215 ng/mL<br>50-54: 48.1-209 ng/mL<br>55-59: 44.7-210 ng/mL<br>60-64: 43.0-220 ng/mL<br>65-69: 40.2-225 ng/mL<br>70-79: 35.1-216 ng/mL<br>80-90: 30.6-208 ng/mL |
| Iron                                   | Serum  | Males: 11.6 – 31.3 umol/L<br>Females: 9.0 – 30.4 umol/L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| TEST NAME                | SAMPLE      | REFERENCE RANGE                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lactate                  | Plasma      | < 2.2 mmol/L                                                                                                                                                                                                                                                                                                                                               |
|                          | CSF         | Neonate 1.1 – 6.7 mmol/L<br>Adult 1.1 – 2.4 mmol/L                                                                                                                                                                                                                                                                                                         |
| Lactate Dehydrogenase    | Serum Fluid | 120 - 246 U/L<br>NA                                                                                                                                                                                                                                                                                                                                        |
| Lead                     | Whole Blood | Occupational exposure: <2.4 umol/L<br><br>0-16 years : 0-0.09 umol/L<br>>=17 years : 0 - 0.22 umol/L<br><br>Alert Value<br>0-16 years : > 0.12 umol/L<br>Action Value<br>0-16 years : > 0.48 umol/L<br>>=17 years : > 1.00 umol/L                                                                                                                          |
| Lithium                  | Serum       | The 12-hour post-dose concentration of lithium is expected to be in the 1.0-1.2 mmol/L                                                                                                                                                                                                                                                                     |
| Luteinising Hormone (LH) | Serum       | <b>Females:</b><br>Normal Menstruating:<br>Follicular 1.9 - 12.5 IU/L<br>Midcycle Peak 8.7 - 76.3 IU/L<br>Luteal Phase 0.5 - 16.9 IU/L<br>Pregnant < 0.1 - 1.5 IU/L<br>Postmenopausal 15.9 - 54.0 IU/L<br>On contraceptives 0.7 - 5.6 IU/L<br><br><b>Males:</b><br>20-70yr 1.5 - 9.3 IU/L<br>> 70yr 3.1 - 34.6 IU/L<br><br><b>Children</b> <0.1 - 6.0 IU/L |
| CD4/CD8 Counts           | Whole Blood | Pan T cells : 51 - 80% (928 - 2379 cells/uL)<br>CD4 : 28 - 48% (497 - 1465 cells/uL)<br>CD8 : 16 -36 % (307 - 925 cells/uL)                                                                                                                                                                                                                                |
| Lymphocyte subsets       | Whole Blood | Pan T cells : 51 - 80% (928 - 2379 cells/uL)<br><br>CD4 : 28 - 48% (497 - 1465 cells/uL)<br><br>CD8 : 16 -36 % (307 - 925 cells/uL)<br><br>Pan B cells : 7-23% (140 - 633 cells/uL)<br><br>NK Cells : 1-8% ( 17-183 cells/uL)                                                                                                                              |

| TEST NAME                               | SAMPLE               | REFERENCE RANGE                                                                                                         |
|-----------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| Magnesium                               | Serum<br>Urine 24 Hr | 0.53 – 1.11 mmol/L<br>3 - 5mmol/24Hr                                                                                    |
| Manganese                               | Blood                | 70.0 - 280.0 nmol/L                                                                                                     |
| Mercury                                 | Blood                | < 30.0 nmol/L                                                                                                           |
| Metanephrines                           | Urine 24 Hr          | Normetanephrines: 0.88 - 2.88 umol/24H<br>Metanephrines: 0.33 - 1.53 umol/24H<br>3-Methoxytyramine: 0.6 to 2.6 umol/24H |
| Methaemoglobin                          | Red Cells            | 0 – 2.0 %                                                                                                               |
| Methotrexate                            | Serum                | Toxic levels:<br>10 umol/L at 24 hours<br>1.0 umol/L at 48 hours<br>0.1 umol/L at 72 hours                              |
| Urine Albumin : Creatinine (ACR)        | Urine,<br>random     | < 3.0 mg/mmol creat                                                                                                     |
| Urine Albumin 24 Hr                     | Urine 24 Hr          | < 30 mg/24H                                                                                                             |
| Mitochondria Ab (AMA)                   | Serum                | Negative                                                                                                                |
| MPO/PR3/GBM Antibodies<br>(Qualitative) | Serum                | 0-10: Neg<br>≥11: Pos                                                                                                   |
| Mucopolysaccharides                     | Urine                | Refer to report                                                                                                         |
| Mycophenolic Acid                       | Plasma               | NA                                                                                                                      |
| Myositis Profile                        | Serum                | Negative: < 5<br>Borderline: 6-10<br>Positive: 11-50<br>Strong Positive: >50                                            |
| Na/K/Cl                                 | Fluid                | NA                                                                                                                      |
| Nickel                                  | Urine,<br>Random     | < 20 nmol/mmol creatinine                                                                                               |
| Occult Blood                            | Faeces               | Negative                                                                                                                |
| Urine Opiates                           | Urine                | Negative                                                                                                                |
| Osmolality                              | Serum                | 275 – 295 mmol/kg                                                                                                       |
| Osmolality (Urine)                      | Urine<br>random      | 50 – 1200 mmol/kg                                                                                                       |
| Paracetamol                             | Serum                | Therapeutic 0.07 – 0.13 mmol/L<br>Toxic >2.0 mmol/L at 4h<br>Toxic >0.3 mmol/L at 12h                                   |
| Paraquat                                | Urine                | Negative                                                                                                                |
| Parathyroid Hormone (PTH) intact        | Plasma               | 1.96-8.49 pmol/L                                                                                                        |
| Phosphate                               | Serum                | 0.78 – 1.65 mmol/L                                                                                                      |
| Phosphate, Urine 24 Hour                | Urine 24 hr          | 15 - 50 mmol/24H                                                                                                        |
| Porphobilinogen                         | Urine                | Negative                                                                                                                |
| Potassium                               | Serum                | 3.6 – 5.2 mmol/L                                                                                                        |
| Potassium, Urine 24 Hour                | Urine 24 hr          | 25 – 125 mmol/24H                                                                                                       |

| TEST NAME                              | SAMPLE              | REFERENCE RANGE                                                                                                                                                                                                                                                                                             |
|----------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Procalcitonin                          | Plasma              | Normal range: <0.10 ng/ml<br><br>Diagnosis of systemic bacterial infection or generalised sepsis:<br><br>Systemic infection unlikely: < 0.5 ng/mL<br><br>Systemic infection possible: ≥ 0.5 – < 2 ng/mL<br><br>Systemic infection likely: ≥ 2 ng/mL<br><br>Severe sepsis or septic shock likely: ≥ 10 ng/mL |
| Progesterone                           | Serum               | <b>Females:</b><br><br>Follicular Phase < 4.5 nmol/L<br>Luteal Phase 10.6 - 81.3 nmol/L<br>Mid Luteal Phase 14.1 - 89.1 nmol/L<br><br><b>Postmenopausal</b> < 2.3 nmol/L                                                                                                                                    |
| Prolactin                              | Serum               | <b>Males:</b> 45 - 375 mIU/L<br><br><b>Females:</b><br>Nonpregnant 59 - 619 mIU/L<br>Pregnant 206 - 4420 mIU/L<br>Postmenopausal 38 - 430 mIU/L                                                                                                                                                             |
| Prostate Specific Antigen (PSA), Total | Serum<br>Fluid      | 0 – 4 ng/mL<br>NA                                                                                                                                                                                                                                                                                           |
| Protein C Activity                     | Plasma              | Protein C 70 – 140 %                                                                                                                                                                                                                                                                                        |
| Protein S activity                     | Plasma              | Protein S 63.5 - 149 %                                                                                                                                                                                                                                                                                      |
| Protein Total                          | Serum<br>Fluid      | 64 - 82 g/L<br>NA                                                                                                                                                                                                                                                                                           |
| Protein Total, Urine 24H               | Urine 24 hr         | 0.05 – 0.15 g/24H                                                                                                                                                                                                                                                                                           |
| Protein Total, CSF                     | CSF                 | 0.08 – 0.32 g/L                                                                                                                                                                                                                                                                                             |
| PT/INR                                 | Plasma              | PT ratio 1 – 1.2                                                                                                                                                                                                                                                                                            |
| PT in second                           | Plasma              | 9.4 - 12.0 secs (changes with reagent lot.<br>Refer to range given with result)                                                                                                                                                                                                                             |
| Pyruvate                               | Whole<br>blood, CSF | 30 – 80 umol/L                                                                                                                                                                                                                                                                                              |
| Renin, Direct                          | Plasma              | Supine 4.2 – 59.7 mIU/L<br>Upright 5.3 – 99.1 mIU/L                                                                                                                                                                                                                                                         |
| Rheumatoid Factor                      | Serum               | < 15.9 IU/mL                                                                                                                                                                                                                                                                                                |
| Salicylate                             | Serum               | Therapeutic 0.2 – 1.45 mmol/L<br><br>Toxic >2.17 mmol/L<br><br>Lethal >4.25 mmol/L                                                                                                                                                                                                                          |

| TEST NAME                                   | SAMPLE      | REFERENCE RANGE                                                                                                                                                                              |
|---------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Selenium                                    | Serum       | Adult: 0.75 - 1.50 umol/L<br>Possible toxicity: > 2.50 umol/L<br>0 - 2 yo: 0.20 - 0.90 umol/L<br>2 - 4 yo: 0.50 - 1.30 umol/L<br>4 - 16 yo: 0.70 - 1.70 umol/L                               |
| Seminal Assay                               | Semen       | Refer to report                                                                                                                                                                              |
| Sex Hormone Binding Globulin(SHBG)          | Serum       | 10.84-180.0 nmol/L                                                                                                                                                                           |
| Smooth Muscle Ab                            | Serum       | Negative                                                                                                                                                                                     |
| Parietal Cell Ab                            | Serum       | Negative                                                                                                                                                                                     |
| Sodium                                      | Serum       | 136 - 145 mmol/L                                                                                                                                                                             |
| Sodium, Urine 24H                           | Urine 24 hr | 40 - 220 mmol/24H                                                                                                                                                                            |
| Sweat test for NaCl                         | Sweat       | < 60 mmol/L                                                                                                                                                                                  |
| Systemic Sclerosis Profile                  | Serum       | Negative: < 5<br>Borderline: 6-10<br>Positive: 11-50<br>Strong Positive: >50                                                                                                                 |
| Testosterone                                | Serum       | Males<br>< 50 years 5.72 - 26.14 nmol /L<br>≥ 50 years 3.00 - 27.35 nmol/L<br>Females<br>Premenopause 0.42 - 2.06 nmol /L<br>Postmenopause < 0.24 - 1.70nmol/L                               |
| Thrombin time                               | Plasma      | 12.8- 16.3 secs                                                                                                                                                                              |
| Thyroglobulin (HTG)                         | Serum       | 0 – 55 ng/mL                                                                                                                                                                                 |
| Thyroglobulin Ab (TgAb)                     | Serum       | 0 – 40 IU/mL                                                                                                                                                                                 |
| Thyroid Peroxidase Ab (TPO)                 | Serum       | 0 – 35 IU/mL                                                                                                                                                                                 |
| Thyroid Stimulating Immunoglobulin (TSI)    | Serum       | Cut off value for Graves Disease is 0.55 IU/L                                                                                                                                                |
| Thyroid-stimulating hormone (TSH)           | Serum       | Adults >18 Y: 0.55 - 4.78 mU/L<br>5 days old to 1 month: 1.23 – 11.5mU/L<br>1 month to 5 yrs old: 0.271 - -7.71mU/L<br>6 to 12 yrs old: 0.622- 5.27mU/L<br>>12 yrs: 0.55-4.78mU/L            |
| Thyroid-stimulating hormone (TSH), Neonatal | Cord Blood  | 2.6 – 20mIU/L                                                                                                                                                                                |
| Thyroxine (T4), Free                        | Serum       | Adults >18Y: 11.5 - 22.7 pmol/L<br>5 days old to 1 month: 11.4 – 29.4 pmol/L<br>1 month to 5 yrs old: 8.5 – 20.4 pmol/L<br>6 to 12 yrs old: 8.9 – 16.2 pmol/l<br>>12 yrs: 11.5 – 22.7 pmol/L |

| TEST NAME                          | SAMPLE             | REFERENCE RANGE                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total P1NP<br>(P1NP, Total)        | Plasma             | Males:<br>25–70 years: 15 – 80 ug/L<br>>70 years: 15 – 115 ug/L<br>Females:<br>Premenopausal<br>25–49 years: 15 – 70 ug/L<br>Menopausal<br>50 –7 0 years: 15 – 90 ug/L                                                                                                                                                                                                                                                             |
| Transferrin                        | Serum              | 2.0 – 3.3 g/L                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Triglyceride                       | Serum<br>Fluid     | < 1.7 mmol/L (NCEP)*<br>NA                                                                                                                                                                                                                                                                                                                                                                                                         |
| Triiodothyronine (T3), Free        | Serum              | 3.5 - 6.5 pmol/L                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Troponin I                         | Plasma             | < 0.06 ng/mL                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Urea                               | Serum<br>Fluid     | 3.2 – 8.2 mmol/L<br>NA                                                                                                                                                                                                                                                                                                                                                                                                             |
| Urea, urine 24H                    | Urine 24 hr        | 430 - 710 mmol/24H                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Uric Acid                          | Serum<br><br>Fluid | Males : 200 - 450 umol/L<br>Females : 150 - 400 umol/L<br>NA                                                                                                                                                                                                                                                                                                                                                                       |
| Uric Acid, Urine 24H               | Urine 24 hr        | 1.5 – 4.5 mmol/24H                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Urinalysis (Urine FEME)            | Urine              | <b>Biochemistry:</b><br>SG 1.005 – 1.030<br>pH 5.0 – 7.0<br>Protein Negative<br>Glucose Negative<br>Ketones Negative<br>Urobilinogen Negative<br>Bilirubin Negative<br>Nitrite Negative<br>Hb Negative<br>Leucocyte Esterase Negative<br><br><b>Microscopy:</b><br>Erythrocyte : 0-3 / µL<br>Leucocytes : F: 0-10 / µL; M: 0-3 µL<br>Epithelial Cells : Negative<br>Casts : Negative<br>Crystals : Negative<br>Bacteria : Negative |
| Urine Pregnancy Test               | Urine              | Neg                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Vanillylmandelic Acid (VMA) Screen | Urine              | Neg                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Vitamin B12                        | Serum              | 157 – 672 pmol/L                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Vitamin D (Total)                  | Serum              | ≥ 50 nmol/L                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Von Willebran : Antigen            | Plasma             | 50 - 150 %                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Von Willebran : Activity           | Plasma             | 50 - 150 %                                                                                                                                                                                                                                                                                                                                                                                                                         |

| TEST NAME | SAMPLE       | REFERENCE RANGE                                                                                                                                                                                |
|-----------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Zinc      | Serum        | Adult males and children > 9 yo: 10.0 - 18.0 umol/L<br>Adult females and children > 9 yo<br>10.70 - 18.0 umol/L<br>Zinc deficiency likely: < 5.0 umol/L<br>Children < 9 yo: 10.0 - 18.0 umol/L |
| Zinc      | Urine, 24 Hr | 3.0 - 19.0 umol/day                                                                                                                                                                            |

\* NCEP ATP III Guidelines At-A-Glance Quick Desk Reference.

**The Laboratory Policy on Protection of Personal Information:**

All personnel adhere to security procedures while working in the laboratory including ensuring security of patient information. The laboratory ensures that reports are released ONLY to clinical personnel who requested for the examination or clinical personnel who is involved in the management of the patient. The Division does not issue reports directly to patients. In the rare circumstance when it is ascertained that the patient is seeking a second opinion or consultation that is relevant to his/her medical care, a DUPLICATE report may be released after approval by the reporting pathologist and the circumstance recorded.

**The Laboratory Complaint Procedure:**

The Laboratory looks into all complaints, incidents, feedback and non-conformances in a positive manner and adheres to the University of Malaya and UMMC procedures for instituting corrective and preventive actions.