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 4th floor, Menara Timur, PPUM. The Inborn Errors of Metabolism (IEM), Toxicology and Trace Elements Analysis is located on the 6th 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.

BIL	FORM TITLE	REFERENCE NUMBER
1	Molecular and Genetics Analysis Laboratory	BK-MIS-1145
2	Peripheral Blood, Bone Marrow and Flow Cytometry Examination	BK-MIS-1146
3	STAT Request Form	BK-MIS-330
4	Cytogenetics Laboratory	BK-MIS-941
5	Inborn Errors Metabolism Laboratory	BK-MIS-054
6	Routine Chemistry and Haematology	BK-MIS-331
7	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:

Condition	Glucose concentration (mmol/l)
Diabetes mellitus	
Fasting	< 7.0
or	
2 hours after glucose load	< 11.1
Impaired glucose tolerance (IGT)	
Fasting (if measured)	< 7.0
and	
2 hours after glucose load	7.8 – 11.0
Impaired fasting glycemia (IFG)	
Fasting	6.1 – 6.9
and *(if measured)*	
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
D - Diagnosis
P - Prognosis
M - Monitoring and Treatment
R - Reduction of recurrence

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

Drug	Time to remove interference
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
Medications			
β-adrenergic blockers	↓	↓↓	↑ (FP)
Central α-2 agonists (e.g. clonidine, α-methyldopa)	↓	↓↓	↑ (FP)
NSAIDs	↓	↓↓	↑ (FP)
K^+ wasting diuretics	→ ↑	↑↑	↓ (FN)
K^+ sparing diuretics	↑	↑↑	↓ (FN)
ACE inhibitors	↓	↑↑	↓ (FN)
ARBs	↓	↑↑	↓ (FN)
Ca^{2+} blockers (DHPs)	→ ↑	↑	↓ (FN)
Renin inhibitors	↓	↓	↑ (FP)
Potassium status			
Hypokalaemia	↓	→ ↑	↓ (FN)
Potassium loading	↑	→↓	↑ (FP)
Dietary sodium			
Sodium restricted	↑	↑↑	↓ (FN)
Sodium loaded	↓	↓↓	↑ (FP)
Advancing age	↓	↓↓	↑ (FP)
Other conditions			
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.)
Adrenocorticotropic 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 STAT : 60 mins	-	Routine Chemistry (2850)
Albumin	Serum	SST Gel Tube	Yellow	3.5 ml	Routine : 2 Hours 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. 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 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/ Bone marrow	EDTA	Purple	2 x 3ml	14 working days	Tests for in-house samples are ordered by Haemapathologists. 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, CBFB-MYH11)	Whole blood/ Bone marrow	EDTA	Purple	2 x 3ml	14 working days	Tests for in-house samples are ordered by Haemapathologists. 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 STAT : 60 mins	-	Routine Chemistry (2850)
Amylase, Urine	Urine random	Plain cup	Yellow	5 ml	Routine : 2 Hours 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 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)
Aspartate Aminotransferase (AST)	Serum	SST Gel Tube	Yellow	3.5 ml	Routine : 2 Hours 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 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 Trephine Biopsy	Trephine 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 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)

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 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 (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 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)
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 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)
CKMB – mass	Serum	SST Gel Tube	Yellow	3.5 ml	Routine : 2 Hours 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 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 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 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 CBFB [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/ Bone marrow	EDTA	Purple	3ml	30 working days	Tests for in-house samples are ordered by Haemapathologists. Send sample within 24hrs of collection	MGAL – Molecular (2205)
Fluid examination	Peritoneal (Ascitic) Fluid Pleural Fluid Pericardial Fluid Synovial Fluid 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)/ 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 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 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)
Haptoglobulin	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/ 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 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 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 (6th Floor, Menara Timur)	Toxicology & Trace Element (2584)
Leucocyte Alkaline Phosphatase (LAP) Score	Peripheral blood / bone marrow smears	Blood - EDTA 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 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 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)
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 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)

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 Haemapathologist 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 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	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. 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)	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 Haemapathologists. 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 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 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 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 (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 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/ 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 STAT : 60 mins	-	Routine Chemistry (2850)
Protein Total, Urine	Urine 24 hr	Na azide (24 hr)	-	As collected	Routine : 2 Hours 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	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. 2. External samples from outside of UMMC should be delivered frozen	Endocrine (2846)
Reticulocyte count	Whole blood	EDTA	Purple	3 ml	Routine: 2 hour 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 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 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)

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 ≥ 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 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 (**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 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 (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 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 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 Haemapathologist: 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 Haemapathologist: 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. **Urine and blood samples MUST be sent together**
Dexamethasone Suppression Test	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 Fluoride Tube x 3	1 working day	1) Dynamic Function Test, Please consult Endocrine Specialist 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 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 Fluoride Tube x7	5 working days	1) Dynamic Function Test, Please consult Endocrine Specialist 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 or 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 EDTA x 1	5 working days	Investigation of bleeding tendency associated with normal platelet count & coagulation screen results. Appointment required (ext. 2848). Blood volume must be followed strictly. Clinical information must be provided
Renal Function Tests (RFT)	Na, K, Cl, HCO_3, 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 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 or 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 Trephine 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 Males>50 years: 1.2-7.2 nmol/L Females<50years: 1.1-12.5 nmol/L 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 Bordeline: 0.40 - 0.49 Positive: >= 0.50 nmol/L
Activated Protein C Resistance (APCR)	Plasma	>2.22
Adrenocorticotropic Hormone (ACTH)	Plasma	0 – 46 pg/mL
Alanine Aminotransferase (ALT)	Serum	10-49 U/L
Albumin	Serum Fluid	32-48 g/L NA
Aldosterone	Serum	Supine: 102 – 859 pmol/L Upright: 102 – 1197 pmol/L
Alkaline Phosphatase	Serum	0-12 yrs : 54 – 369 U/L >12 yrs : 45 – 129 U/L
Allergy Testing 54 Allergens	Serum	Negative: < 5 Borderline: 6-10 Positive: 11-50 Strong Positive: >50
Alpha-1 Antitrypsin (AAT)	Serum	90 – 200 mg/dL
Alpha-Fetoprotein (AFP)	Serum Fluid	0 – 6.7 IU/mL NA
Aluminium	Serum	Adult: < 0.4 umol/L Chronic Kidney Disease: < 2.20 umol/L
Aluminium	Urine	24 hr urine: 0.2 - 2.0 umol/day Random urine: 5.0 - 70.0 nmol/mmol creatinine
Amino Acids	Blood, CSF, urine	Refer to report
Ammonia	Plasma	11.2-35.4 umol/L
Amphetamine/Methamphetamine	Urine	Negative
Amylase	Serum Fluid	30 – 118 U/L NA
Amylase (Urine random)	Urine 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	Healthy Women: 20 - 24 years 10.9 - 71.0 pmol/L 25 - 29 years 8.57 - 64.6 pmol/L 30 - 34 years 5.08 - 54.2 pmol/L 35 - 39 years 2.89 - 49.7 pmol/L 40 - 44 years 0.421 - 31.7 pmol/L 45 - 50 years 0.071 - 12.8 pmol/L PCOS Women 17.2 - 122 pmol/L Healthy Men : 10.2 – 82.8 pmol/L
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 Random urine: < 90 nmol/mmol creatine
Aspartate Aminotransferase (AST)	Serum	< 34 U/L
Beta-CrossLaps	Plasma	Males: 25–70 years: 100 – 600 >70 years: 100 – 750 Females: Premenopausal 20–49 years: 150 – 800 Menopausal 50–70 years: 50 – 800
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 Fluid	< 17 umol/L NA

TEST NAME	SAMPLE	REFERENCE RANGE
Bleeding Time	Whole Blood	1 – 5 minutes
Blood Gases	Whole Blood, arterial	pH 7.36 – 7.44 pCO_2 35 - 45mmHg pO_2 80 - 100mmHg BE (-2) – 3 Bicarb 21 – 28 mmol/l
Blood Gases	Whole Blood, venous	pH 7.32 - 7.43 pCO2 40 - 50mmHg pO2 25 -40mmHg Bicarb 23-29 mmol/L
Bone Marrow Examination	Bone Marrow Aspirate / Trephine Biopsy	Refer to report
B-type Natriuretic Peptide (BNP)	Plasma	< 100pg/ml
CA 125	Serum Fluid	0 – 30 U/ml NA
CA 15-3	Serum Fluid	<32.4 U/ml NA
CA 19-9	Serum Fluid	<37.0 U/ml NA
Cadmium	Blood	Occupational Exposure: 0 - 90.0 nmol/L Non-smokers: < 30 nmol/L 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 50-200 ug/g- Mild organic disease such as inflammation, mild diverticulitis, IBD in remission. >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 NA

TEST NAME	SAMPLE	REFERENCE RANGE
Catecholamines	Urine 24 hr	Adrenaline 9.2 – 122.3 nmol/24H Noradrenaline 71.5 – 505.3 nmol/24H 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 Fluid	< 5.2 mmol/L (desirable) 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 (FII, FV, FVII, FVIII, FIX, FX, FXI or FXII)	Plasma	FII : 79 - 131% FV : 62 - 139% FVII : 50 - 129% FVIII : 50 - 150% FIX : 65 - 150% FX : 77 - 131% FXI : 65 - 150% FXII : 50 - 150%
Complement 3 (C3)	Serum	90-180 mg/dL
Complement 4 (C4)	Serum	10-40 mg/dL
Complete Blood Count (CBC)	Whole Blood	Hb (Male) 130 – 170 g/L, (Female) 120 – 150 g/L Hct (Male) 0.4 0 – 0.50 l/l, (Female) 0.36 – 0.46 l/l RBC (Male) 4.5 – 5.5, (Female) 3.8 – 4.8 $x10^{12}$ /L MCV 77 – 97 fl MCH 27 – 32 pg MCHC 315– 345 g/L WBC 4 – 10 $x10^9$ /L Plt 150 – 400 $x10^9$ /L Reticulocyte 0.5-2.5 % Neutrophils 2.0 - 7.0 x 10^9/L Lymphocytes 1.0 - 3.0 x 10^9/L Eosinophil 0.02- 0.5 $x10^9$/L Monocytes 0.2 - 1.0 x 10^9/L Basophil 0.02 - 0.1 x 10^9/L

TEST NAME	SAMPLE	REFERENCE RANGE
Conventional Cytogenetics (Genetics)	Whole Blood	Male : 46,XY 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 Random: < 0.1 umol/mmol creatinine
Cortisol	Serum	7-9am: 145 – 619 nmol /L 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 Females 34-145 U/L
Creatinine	Serum Fluid	Males 54 – 97 umol/L Females 44 – 71 umol/L 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 Females 0.9 – 11.7 umol/L
ds-DNA Ab Quantitation	Serum	< 200 IU/mL
ds-DNA Ab Screen	Serum	Negative
Erythropoeitin(EPO)	Serum	4.3 - 29 IU/L
ESR	Whole Blood	Male < 21 mm/hr Female < 29 mm/h
Estradiol	Serum	**Males** : ND - 146 pmol/L **Menstruating Female :** Follicular Phase 72 - 529 pmol/L Midcycle 235 - 1309 pmol/L Luteal Phase 205 – 786 pmol/L **Post Menopausal Female** (untreated) 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 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	**Males** 13 – 70yr: 1.4 – 18.1 IU/L **Menstruating Females :** Follicular Phase: 2.5 – 10.2 IU/L Midcycle Peak: 3.4 – 33.4 IU/L Luteal Phase: 1.5 – 9.1 IU/L Pregnant: < 0.3 IU/L **Post Menopausal Female** 23.0 – 116 IU/L
Free Light Chain Kappa & Lambda	Serum	Kappa: 6.7-22.4 mg/L Lambda: 8.3-27.0 mg/L Kappa/Lambda Ratio: 0.26-1.65
Fructosamine	Serum	205-285 umol/L
Gamma Glutamyl Transferase (GGT)	Serum	Males : < 73 IU/L Females : <38 IU/L
Glucose	Plasma Fluid	< 5.6 mmol/L (Fasting) < 7.8 mmol/L (Random) < 11.1 mmol/L (Postprandial) NA
Growth Hormone	Serum	Males: < 3 ng/mL Females: < 8 ng/mL
Haptoglobulin	Serum	30 – 200 mg/dL
HbA1C	Whole Blood	< 6.5% (NGSP) < 48 mmol/mol (IFCC)
Human Chorionic Gonadotropin (HCG)	Serum Fluid	Premenopausal Females: <6 IU/L Postmenopausal Females: <10 IU/L Males: <2 IU/L 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 Male: 0-3 :15.0 - 129 ng/mL 4-6: 22 - 208 ng/mL 7-9: 40.1 - 255 ng/mL 10-11: 68.7 -316 ng/mL 12-13: 143-506 ng/mL 14-15: 177-507 ng/mL 16-18: 173-414 ng/mL Female: 0-3: 18.2- 172 ng/mL 4-6: 35.4-232 ng/mL 7-9: 56.9-277 ng/mL 10-11: 118-448 ng/mL 12-13: 170-527 ng/mL 14-15: 191-496 ng/mL 16-18: 190-429 ng/mL Adult 19-21: 117-323 ng/mL 22-24: 98.7- 289 ng/mL 25-29: 83.6-259 ng/mL 30-34: 71.2-234 ng/mL 35-39: 63.4-223 ng/mL 40-44: 58.2 -219ng/mL 45-49: 53.3-215 ng/mL 50-54: 48.1-209 ng/mL 55-59: 44.7-210 ng/mL 60-64: 43.0-220 ng/mL 65-69: 40.2-225 ng/mL 70-79: 35.1-216 ng/mL 80-90: 30.6-208 ng/mL
Iron	Serum	Males: 11.6 – 31.3 umol/L 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 Adult 1.1 – 2.4 mmol/L
Lactate Dehydrogenase	Serum Fluid	120 - 246 U/L NA
Lead	Whole Blood	Occupational exposure: <2.4 umol/L 0-16 years : 0-0.09 umol/L >=17 years : 0 - 0.22 umol/L Alert Value 0-16 years : > 0.12 umol/L Action Value 0-16 years : > 0.48 umol/L >=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	**Females:** Normal Menstruating: Follicular 1.9 - 12.5 IU/L Midcycle Peak 8.7 - 76.3 IU/L Luteal Phase 0.5 - 16.9 IU/L Pregnant < 0.1 - 1.5 IU/L Postmenopausal 15.9 - 54.0 IU/L On contraceptives 0.7 - 5.6 IU/L **Males:** 20-70yr 1.5 - 9.3 IU/L > 70yr 3.1 - 34.6 IU/L **Children** <0.1 - 6.0 IU/L
CD4/CD8 Counts	Whole Blood	Pan T cells : 51 - 80% (928 - 2379 cells/uL) CD4 : 28 - 48% (497 - 1465 cells/uL) CD8 : 16 -36 % (307 - 925 cells/uL)
Lymphocyte subsets	Whole Blood	Pan T cells : 51 - 80% (928 - 2379 cells/uL) CD4 : 28 - 48% (497 - 1465 cells/uL) CD8 : 16 -36 % (307 - 925 cells/uL) Pan B cells : 7-23% (140 - 633 cells/uL) NK Cells : 1-8% (17-183 cells/uL)

TEST NAME	SAMPLE	REFERENCE RANGE
Magnesium	Serum Urine 24 Hr	0.53 – 1.11 mmol/L 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 Metanephrines: 0.33 - 1.53 umol/24H 3-Methoxytyramine: 0.6 to 2.6 umol/24H
Methaemoglobin	Red Cells	0 – 2.0 %
Methotrexate	Serum	Toxic levels: 10 umol/L at 24 hours 1.0 umol/L at 48 hours 0.1 umol/L at 72 hours
Urine Albumin : Creatinine (ACR)	Urine, 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 (Qualitative)	Serum	0-10: Neg >=11: Pos
Mucopolysaccharides	Urine	Refer to report
Mycophenolic Acid	Plasma	NA
Myositis Profile	Serum	Negative: < 5 Borderline: 6-10 Positive: 11-50 Strong Positive: >50
Na/K/Cl	Fluid	NA
Nickel	Urine, Random	< 20 nmol/mmol creatinine
Occult Blood	Faeces	Negative
Urine Opiates	Urine	Negative
Osmolality	Serum	275 – 295 mmol/kg
Osmolality (Urine)	Urine random	50 – 1200 mmol/kg
Paracetamol	Serum	Therapeutic 0.07 – 0.13 mmol/L Toxic >2.0 mmol/L at 4h 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 Diagnosis of systemic bacterial infection or generalised sepsis: Systemic infection unlikely: < 0.5 ng/mL Systemic infection possible: ≥ 0.5 – < 2 ng/mL Systemic infection likely: ≥ 2 ng/mL Severe sepsis or septic shock likely: ≥ 10 ng/mL
Progesterone	Serum	**Females:** Follicular Phase < 4.5 nmol/L Luteal Phase 10.6 - 81.3 nmol/L Mid Luteal Phase 14.1 - 89.1 nmol/L **Postmenopausal** < 2.3 nmol/L
Prolactin	Serum	**Males:** 45 - 375 mIU/L **Females:** Nonpregnant 59 - 619 mIU/L Pregnant 206 - 4420 mIU/L Postmenopausal 38 - 430 mIU/L
Prostate Specific Antigen (PSA), Total	Serum Fluid	0 – 4 ng/mL NA
Protein C Activity	Plasma	Protein C 70 – 140 %
Protein S activity	Plasma	Protein S 63.5 - 149 %
Protein Total	Serum Fluid	64 - 82 g/L 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. Refer to range given with result)
Pyruvate	Whole blood, CSF	30 – 80 umol/L
Renin, Direct	Plasma	Supine 4.2 – 59.7 mIU/L Upright 5.3 – 99.1 mIU/L
Rheumatoid Factor	Serum	< 15.9 IU/mL
Salicylate	Serum	Therapeutic 0.2 – 1.45 mmol/L Toxic >2.17 mmol/L Lethal >4.25 mmol/L

TEST NAME	SAMPLE	REFERENCE RANGE
Selenium	Serum	Adult: 0.75 - 1.50 umol/L Possible toxicity: > 2.50 umol/L 0 - 2 yo: 0.20 - 0.90 umol/L 2 - 4 yo: 0.50 - 1.30 umol/L 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 Borderline: 6-10 Positive: 11-50 Strong Positive: >50
Testosterone	Serum	Males < 50 years 5.72 - 26.14 nmol /L ≥ 50 years 3.00 - 27.35 nmol/L Females Premenopause 0.42 - 2.06 nmol /L 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 5 days old to 1 month: 1.23 – 11.5mU/L 1 month to 5 yrs old: 0.271 - -7.71mU/L 6 to 12 yrs old: 0.622- 5.27mU/L >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 5 days old to 1 month: 11.4 – 29.4 pmol/L 1 month to 5 yrs old: 8.5 – 20.4 pmol/L 6 to 12 yrs old: 8.9 – 16.2 pmol/l >12 yrs: 11.5 – 22.7 pmol/L

TEST NAME	SAMPLE	REFERENCE RANGE
Total P1NP (P1NP, Total)	Plasma	Males: 25–70 years: 15 – 80 ug/L >70 years: 15 – 115 ug/L Females: Premenopausal 25–49 years: 15 – 70 ug/L Menopausal 50 –7 0 years: 15 – 90 ug/L
Transferrin	Serum	2.0 – 3.3 g/L
Triglyceride	Serum Fluid	< 1.7 mmol/L (NCEP)* NA
Triiodothyronine (T3), Free	Serum	3.5 - 6.5 pmol/L
Troponin I	Plasma	< 0.06 ng/mL
Urea	Serum Fluid	3.2 – 8.2 mmol/L NA
Urea, urine 24H	Urine 24 hr	430 - 710 mmol/24H
Uric Acid	Serum Fluid	Males : 200 - 450 umol/L Females : 150 - 400 umol/L NA
Uric Acid, Urine 24H	Urine 24 hr	1.5 – 4.5 mmol/24H
Urinalysis (Urine FEME)	Urine	**Biochemistry:** SG 1.005 – 1.030 pH 5.0 – 7.0 Protein Negative Glucose Negative Ketones Negative Urobilinogen Negative Bilirubin Negative Nitrite Negative Hb Negative Leucocyte Esterase Negative **Microscopy:** Erythrocyte : 0-3 / µL Leucocytes : F: 0-10 / µL; M: 0-3 µL Epithelial Cells : Negative Casts : Negative Crystals : Negative 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 Adult females and children > 9 yo 10.70 - 18.0 umol/L Zinc deficiency likely: < 5.0 umol/L 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.