Laboratory Service Guide

Contents

1.0 INTRODUCTION

1.1 Overview

Gnosis Laboratories (M) Sdn Bhd, a medical laboratory company which began operation in the year 2002, was jointly created by Lezen Reference Laboratories and local medical laboratory professionals. Gnosis Laboratories works with physicians, hospitals and other healthcare providers to help deliver better outcomes in patient care. We offer the following services:

- A broad range of routine laboratory tests
- Access to highly specialised clinical tests
- Occupational Health Services
- Functional Health Test
- Laboratory testing and management for hospitals
- Professional health services for employers, insurers and government agencies

Lezen Reference Laboratories (http://www.lezen.com.tw) is a well-known and respected company of Taiwanese nationality. Lezen Reference Laboratories was established in 1978 and has since grown to be a major medical reference laboratory for clinics, medical laboratories, hospitals and university research units. They received and performed approximately 5,000 patient cases a day, with numerous requests for routine and special testing. As a reference and research-led medical laboratory, Lezen Reference Laboratories always seeks collaboration with medical and academic institutions to be actively involved in research projects.
For Lezen Reference Laboratories, joint venture partnerships open up new market opportunities and access to Malaysian local market knowledge. For Gnosis Laboratories (M) Sdn Bhd, the benefits include gaining access to world-leading technologies and proven experience in delivering large-scale projects.

Service Quality
Gnosis Laboratories' core concern is always about providing accurate and time-efficient laboratory results to our medical partners. We demonstrate our commitment to continuous quality improvement through a series of interrelated quality control and quality assurance programs which evaluate our pre-analytical, analytical and post-analytical services. Among the programs are:

- Taiwan Accreditation Foundation (TAF), according to ISO 15189 standards
- College of American Pathologists (CAP) Proficiency Surveys
- Biorad, External Quality Assessment Scheme (EQAS) from California, USA
- The Royal College of Pathologists of Australasia Quality Assurance Programs (RCPAQAP)

1.2 Gnosis Laboratories Policy On Impartiality

Gnosis Laboratory Sdn Bhd is committed to delivering accurate and reliable diagnostic services. All personnel are expected to perform their duties with impartiality and objectivity, ensuring that results and decisions are based solely on scientific and clinical evidence.

1.3 Laboratory's Policy On Confidentiality Of Patient Information

GENERAL POLICY

The Gnosis Laboratory will ensure the protection of its customers' proprietary rights and maintain confidential information about patients and other users of the laboratory.

Management Of Information

In compliance with the Personal Data Protection Act 2010, the confidentiality of patient information will be maintained at all times.

a) It is the laboratory's policy to protect all patients' personal information, including information that:
- Is received, maintained or transmitted in ANY format
- Relates to the patient's past, present, or future medical information,
- Treatment, or payment for care.
- Identifies the patient or could be used to identify the patient.

b) Only authorised healthcare providers can access patients' health information in the Gnosis Laboratory Information System(GIMS)
c) Once the report is successfully sent and acknowledged receipt by the requestor, it is considered the property of the requestor.
d) **Do not attempt to recycle the unused Laboratory report for any purposes**

Release of information

a) Patient results are only telephoned to the ordering clinician or authorised/designated employees within the originating clinic or healthcare facility.
b) Patient results must only be faxed to designated fax numbers as provided by the clinician
c) Electronic results sent via email are transmitted in an encrypted format to designated addresses
d) Hard copy reports are placed in closed folders or envelopes before being sent to the originating clinic or ordering physician
e) Sensitive results (where known, e.g., HIV reactive, Western Blot, etc) are handled with extra precaution, with results sent to the ordering physician in a sealed envelope if the ordering physician is still routinely receiving paper copies of results.

Exception in release of information.

The Private Healthcare Facilities and Services Act 1998 (Act 586) and its regulations, along with the MMC Code of Professional Conduct 2019, govern the release of patient information by private laboratories to the Ministry of Health (KKM), emphasising patient consent and confidentiality, while also allowing for exceptions in specific circumstances. *Exceptions include:*

a) **Notifiable Diseases:** Certain diseases are legally mandated to be reported to the *Ministry of Health (KKM)*, regardless of patient consent.
b) **Court Orders:** A court order may compel the release of patient information for legal proceedings.
c) **Specific Legislation:** Other laws may require the disclosure of certain health information to the MOH.
d) **Public Health Interest**:
Public Health Emergencies: In situations of public health emergencies, such as outbreaks of infectious diseases (e.g. COVID), the *Ministry of Health (KKM* may require access to patient information to effectively manage and control the situation.

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As a general rule, if there is any uncertainty regarding the confidentiality of any patient's results, the
The query should be referred to the Laboratory Quality Manager and/or Laboratory Director.

1.4 Location of the Gnosis Laboratories, address and contact information

The addresses and contact numbers of Laboratory Headquarters and Branch Laboratories are as below.
Website: gnosis-healthcare.com

Subang Jaya (Central Lab):
Address: 64-1, Jalan SS15/4, 47500 Subang Jaya, Selangor, Malaysia. Tel: 603-5621 9177/ 9277/ 9377
Fax: 603-5621 9077
Contact Person: Yap Choon Pee, Edwin Singhe, Lam Mun Churn E-mail: hqlab@gnosis-healthcare.com

Ipoh Branch
Address: Hospital Seri Botani, Level 1, Pathology Lab, No. 3, Dataran Botani 2, Bandar Seri Botani, 31350 Ipoh, Perak Darul Ridzuan.
Tel. No.: +605-226 2768 / +6012 500 1822
Contact Person: Shirley Yeoh Yee Siew
E-mail: ipoh.manager@gnosis-healthcare.com

Penang Branch
Address: 70-2-56A, D'Piazza Mall, Jalan Mahsuri, 11900 Bayan Baru, Penang
Tel. No.: +604-642 8771
Contact Person: Chuah Ban Chung, Foong Yao Ping
E-mail: penang.manager@gnosis-healthcare.com, penanglab@gnosis-healthcare.com

Johor Bahru Branch
Address: 10-A, Jalan Indah 1, Taman Bukit Indah, 81200 Skudai, Johor Bharu, Johor.
Tel. No.: +607-2445177
.Fax. No.: +607-2445077
Contact Person: Malar Valyy A/P Thulasidasan E-mail: jblab@gnosis-healthcare.com

Kulim Branch
Address: 9, Jalan Lunas, Taman Badlishah, Kelang Lama, 09000 Kulim, Kedah. Tel. No.: +604-4902315
Contact Person: Chuah Ban Chung
E-mail: penang.manager@gnosis-healthcare.com

Melaka Branch
Address: No. 9-1 (1st Floor), Jalan KL 3/15, Taman Kota Laksamana, Seksyen 3, 75200 Melaka.
Tel. No.: +606-2811288
Contact Person: Lee Kah Wai
E-mail: melaka.manager@gnosis-healthcare.com

Klang Branch
Address: 38A, First Floor, Jalan Batu Unjur 1, Taman Bayu Perdana, 41200 Klang, Selangor.
Tel: +603-3311 5817
Contact Person: Puan Zawin
Email: klanglab@gnosis-healthcare.com

Seremban Branch
Address: 28-1, Jalan Rasah Prima 2, Pusat Komersial Rasah Prima, 70200 Seremban, Negeri Sembilan Darul Khusus.
Tel: +606-6316 788
Contact Person: Ms Kuga Andy
Email: serembanlab@gnopsis-healthcare.com

Kota Kinabalu Branch
Address: Lot A-1-1, First Floor, Block A, 88 MarketPlace, Jalan Pintas, 88300 Kota Kinabalu, Sabah.
Tel. No.: +6088-212 525
Contact Person: Liew Gar Yee
E-mail: sabah.manager@gnosis-healthcare.com

Sibu Branch
Address: 14, Jalan Pedada, 96000 Sibu, Sarawak. Tel. No.: +084-332600
.Fax. No.: +084-346700
Contact Person: Doreen Tiong
E-mail: doreentiong@gnosis-healthcare.com

Kuching Branch
Address: 33, Sublot 7, Lot 1108, Block 10, KCLD Kueh Hock Kui Comm Ctr, Jalan Tun Ahmad Zaidi Adruce, 93250 Kuching, Sarawak.
Tel. No.: +082-245996
.Fax. No.: +082-245996
Contact Person: Joseph Niler AK Bimbang E-mail: josephniler@gnosis-healthcare.com

Miri Branch
Address: Lot 292, Beautiful Jade Centre, Jalan Bendahara, 98000 Miri, Sarawak. Tel. No.: +085-439068
.Fax. No.: +085-439069
Contact Person: Doreen Tiong
E-mail: doreentiong@gnosis-healthcare.com

Bintulu Branch
Address: 1st Floor, Lot 3302, No. 16, Parkcity Commercial Centre, 97000 Bintulu, Sarawak. Tel. No.: +6086-317400
Contact Person: Doreen Tiong
E-mail: doreentiong@gnosis-healthcare.com

1.5 Operation Hours of the Gnosis Laboratory

Day	**Routine Hours**	***On-Call Hours***
Monday to Friday	9:00 am to 5:30 pm	5:30 pm to 7.00 pm
Saturday	9:00 am to 1:00 pm	1:00 pm to 3:00 pm
Sunday	-	9:00 am to 3:00 pm
Public Holiday	Close	Subject to notification

The above service hours apply to HQ only. Please check with the particular branch for the exact opening hours.

1.6 Type of Laboratory Services

Routine Tests
Gnosis Laboratories always seeks and employs state-of-the-art technology in providing the highest quality and reliable test results for our customers.
The routine tests that we are providing are:

- Clinical Chemistry
- Haematology
- Urinalysis
- Immunoassay
- Microbiology
- Histology
- Cytology

Our routine tests package is designed based on cost-effectiveness and its usefulness in helping physicians to assess and diagnose patients.
Refer to our Service Catalogue for details.

Specialized Tests
Together with our partners, we provide access to specialised clinical tests that range from early detection of cancer to diagnosing allergies, from measuring Growth Hormone, HBV DNA Viral Load to providing Functional Medicine Testing.
Among the specialised clinical laboratory tests are as follows:

- Anti-CCP
- Allergy Testing: Allergy AD40 (40 types of allergens)
- Tumour marker for lung: Cyfra 21-1,NSE, SCC Ag
- Tumour marker for stomach: CA 72-4
- Infertility testing: Anti-Mullerian Hormone (AMH)
- DNA Paternity Testing
- Prenatal Screening Test: Double Tests (Down's syndrome screen), First Trimester Down's Syndrome Screen, Second Trimester Quadruple test for Down's syndrome screen
- Herpes simplex virus (HSV 1 & 2) typing
- Human Papillomavirus (HPV) genotyping and Cervical Cancer screening
- HBV DNA Viral Load and Genotyping
- HCV RNA Viral Load and Genotyping
- HIV RNA Viral Load
- Chlamydia DNA Test
- Gonorrhoea DNA Test
- Mycobacterium Tuberculosis DNA Testing
- Ageing Hormone: IGF-1, DHEA-S, Insulin, C-peptide, Testosterone, Dihydrotestosterone, etc
- Protein electrophoresis, immunoglobulin electrophoresis, Hb electrophoresis, etc
- Heavy Metal toxicity: Mercury, Arsenic, Lead, etc
- Oncology Testing

Functional Health Tests

Gnosis Laboratories' dedication to innovation has led us to investigate a variety of new areas to expand our testing base, thereby providing healthcare providers with a comprehensive diagnostic menu to serve their patients. Gnosis Laboratories is looking at Functional medicine as a new approach to help physicians manage and prevent chronic disease that embodies the art and science of medicine. Functional Medicine integrates what we know about how the human body works with patient-centred, science-based care. Functional medicine addresses the causes of chronic disease, which are rooted in lifestyle choices, environmental exposures, and genetic influences.
Please refer to the Nutritional Medicine Assessment Service Catalogue for details.

Examination Offered By Laboratory
Please refer to the **Gnosis Service Catalogue** for the full range of examinations offered by the laboratory, including, as appropriate, information concerning samples required, primary sample volumes, special precautions, turnaround time, and price.
Please contact the lab servicing in your area for details of biological reference intervals and clinical decision values.

Complaint or Feedback

To continue to improve and provide better service, we need the valuable feedback and suggestions from you, as our valued customer.

If you have a complaint or feedback (positive /negative), please:-

1. Contact the Customer Service Centre, Marketer or Laboratory frontline staff. Operational Manager/Business Manager
2. The telephone numbers have been given for each branch in the list of branches above
3. Obtain feedback forms, which are available in all the branches.
4. Feedback can also be provided via GNOSIS LAB HOTLINE +6 (03) - 588-58501 or online on our website https://gnosis-healthcare.com
5. Verbal complaints may also be given to the staff at the counter in all the branches,
6. Acknowledgement and the complaint number will be given immediately
7. For all the other modes of feedback, acknowledgement will done within 48 hours (either verbally through a telephone call or email)
8. All complaints will be investigated, and a written reply will be given to the complainant as soon as the investigation is over.
9. If the complainant requires further clarification, to be provided in writing or a face-to-face meeting, a meeting will be arranged with the relevant parties to help resolve the matter and give closure to the complaint.

2.0 GENERAL REQUIREMENTS

2.1 Patient Preparation

Pre-instruction should be provided to the patient, such as fasting, special dietary consumption, or other requirements, before sample collection. In the event that the test requires self-collection of the sample, kindly provide specific instructions to the patient.

2.2 Patient Identification

a) Each patient must be identified using active communication techniques. At least **two patient identifiers** (patient's name / Identification number (I.C. No / Passport number / MRN, etc) are needed before collecting the sample from the patient.

b) The patient's identity is verified by asking the patients to identify themselves before collecting the samples.

c) The sample tubes/containers shall be labelled with the identifiers in the presence of the patient at the time of collection.

2.3 Patient's Informed Consent

a) Please provide a clear explanation to the patients about the laboratory tests and how they will be collected. .
b) For most routine laboratory procedures, consent can be inferred when the patient willingly submits to the sample collection procedure, for example, venipuncture.
c) Where necessary, such as HIV testing, please obtain written informed consent
d) Special procedures, including more invasive procedures or those with an increased risk of complications to the procedure, may need a more detailed explanation and, in some cases, recorded consent.
e) If obtaining consent is not possible in emergencies, the laboratory may carry out necessary procedures, provided they are in the patient's best interest. Please Note in the Test Requisition Form.

2.4 Sample Collection

The samples should be properly collected in appropriate containers.
The containers must be labelled with at least two identifiers (i.e. name of patient and patient's I.C. number) and the name of the test requested.
The containers should be placed in biohazard plastic bags with the respective request forms stapled outside the bag.

2.5 Types of containers

Refer to the list of tests for the guidelines and recommendations.

2.5.1 Type Of Vacutainer Tubes

Blood collection tube	Additives	Volume	Mix by inverting	Common Use
Yellow	Serum Separator Tube (SST) Plain tube with gel	5 ml	Invert the tube gently 6-8 times after collection	**Chemical Pathology**: General chemistry, Tumour markers, Hormones, Special proteins, Anaemia profile, Protein electrophoresis, **Microbiology:** Immuno. serology and virology (other than molecular)
Red	Plain tube without gel	7ml	Invert the tube gently 6-8 times after collection	Chemical Pathology: Rheumatoid Factor, Therapeutic drug monitoring (TDM) except Immunosuppressant Microbiology: Virology
Lavender	EDTA (K2)	3ml	Note: Adequate sample volume is VERY IMPORTANT. Invert the tube gently 8-10 times after collection.	**Chemical Pathology**: ACTH (in ice), HbA1c, Ammonia, Cyclosporin, Tacrolimus **Haematology**: Haematology test, except coagulation **Microbiology:** Molecular test
Grey	Sodium Flouride Or Potassium Oxalate	2m	Invert the tube gently 8-10 times after collection.	**Chemical Pathology:** Glucose, Lactate
Green	Lithium heparin	2 ml	Invert the tube gently 8-10 times after collection.	**Chemical Pathology:** General chemistry **Haematology:** Osmotic Fragility Test
light blue	sodium citrate	2ml	Note: Adequate sample volume is VERY IMPORTANT. To be filled up to the indicator line. Invert the tube gently 3-4 times after collection.	**Haematology:** Coagulation test, Bleeding Disorder, Thrombophilia Testing,
Royal blue with red label	Trace elements (TET) Plain	7ml	No need mixing	Trace elements or heavy metals assay in serum or urine.
Royal blue with lavender label	Trace elements (TET) EDTA	7ml	Mix well 3 to 4 times	Trace elements or heavy metals assay in whole blood

2.5.2 Type Of Container

Image	Type of container	Sample
	- Universal sterile container. Ensure the cap is tight to prevent specimen leakage - Do not add formalin for tissue culture and cytology specimens	- Chemical Pathology: Urine and other body fluid biochemistry - Medical Microbiology: Urine, body fluid and tissue culture Haematology: Trephine biopsy - Histopathology: Small biopsy (add 10% formalin) - Cytology: FNAC specimen
	24 hr urine container	24 hr urine collection
	Stool container	- Stool C+S - Stool for rotavirus - Stool for C. diff Ag - Stool for Ova & Cyst
	PathTezt™ EasyVial ™ kit	Liquid cytology preparation (LC-Prep).

Use the ***appropriate containers*** for different types of tests and provide an adequate sample. Specimens sent in with an incorrect container or improper/no labelling will be rejected. Refer to the Gnosis Service Guide Guideline for further details.

2.6 Labelling the Sample Container

A properly labelled sample is essential so that the test results match the patient. The key elements in labelling are:

- ❖ Patient's surname, first and middle.
- ❖ Patient's ID number.

NOTE: Both of the above patient identifiers MUST match the one on the requisition form.

Refer to the details below on how to label the patient's details on the sample tube or container. Failure to adhere to this will result in delayed analysis

Label the vacutainer tubes with
a) Patient's details (name & IC) can be written on the blood tubes or using a secondary label. b) If a secondary label is used, the label should cover only the primary tube label. This is important so that the sample can be visualised.

Correct way for labelling the test tubes	Incorrect way for labelling the test tubes
	

2.7 Packaging the sample

Clinical/biological samples should be placed in a sealed container or a specimen container. Refer to the relevant sections in the specific sample collection.

2.8 Test Requisition Form

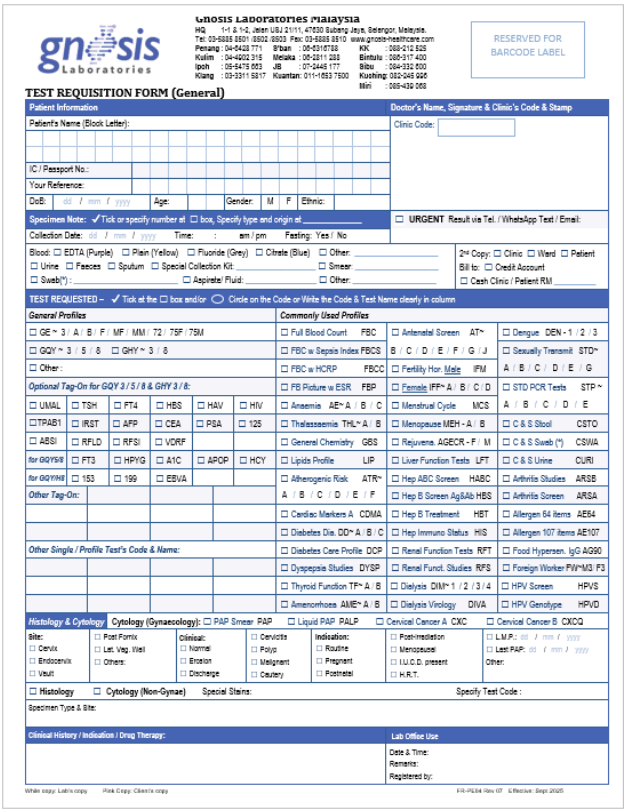
Instructions For Completion Of Test Requisition Form

Submission of requests for laboratory testing shall be accompanied by a GNOSIS request form. The ***Request Form*** must be filled in clearly (type or hand-printed).
This requisition form must contain essential information to proceed with laboratory testing. The essential elements of the requisition form are

Patient's Full Name & second identifier (NRIC or Passport)
Patient's age, date of birth & gender
Date & time of specimen collection
Diagnosis or Clinical History (Where Applicable)
Name and signature of requesting doctor, clinic stamp and telephone number
Special attention if required (Urgent/Phone/Fax No.)
Nature/source of specimen
Specimen Status (Fasting or non-fasting)
Examination required

Mark (√) at the appropriate box for the tests required.
Tests which are not listed in the request form should be stated under the column OTHERS.
For Histopathology, Microbiology and Virology, the type of Sample should be stated under the appropriate column.
The word "URGENT" must be written clearly or stamped preferably in red at the top on the right-hand corner of the request form.

Gnosis **Test Codes** should be written on the Request Form to indicate the tests ordered. All phoned-in verbal requests for additional test requests to be added to a written order should be followed by written confirmation as soon as possible.
If a test is ordered that can be performed by several ***methodologies*** and the method is not specified on the Test Request Form, the test will be performed by a method which generally has the greatest clinical utility or availability.



Gnosis Laboratories Malaysia

TEST REQUISITION FORM (General)

Gnosis Laboratories Malaysia

TEST REQUISITION FORM (Prenatal & Genetic Testing)

2.9 Sample storage

a) All samples collected should be kept within the recommended temperature while waiting for laboratory pick-up services.

b) Blood specimen for electrolytes assay, especially potassium, blood for cytogenetics, leukocyte antigens, lymphocytic markers, cryoglobulins and blood culture should NOT keep refrigerated.
It should be delivered to the lab as soon as possible.

c) Most hormones and enzymes will decrease in activity through time or in warm temperatures. It should be keep refrigerated if immediate delivery to lab is unavailable.

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2.10 Transportation of the sample

All specimen containers must be ***labelled*** with ***patient's name*** and a unique numerical identifier and accompanied by the Request Form. The specimen container must be tightly capped and put into the Biological Specimen Bag and zipped. The Request Form shall be placed into the "kangaroo" pocket.
All samples collected are sent to laboratory as soon as possible.
All samples will be picked up from the clinics via the morning and evening routes, or according to pre-determined schedules.

Sample pick-ups for urgent test request can be arranged with Gnosis respective branch laboratories.
Please do not send samples that are not urgent after normal office hours.

The samples should be transported to the laboratory within an appropriate time frame.
The time of samples received at the counter should be clocked in by the laboratory user.

Our courier will make the routine specimen collection ***twice a day*** (morning or afternoon) for the normal working day. Please kindly inform us if you need a different arrangement for routine specimen collection.

Urgent Requests- We will respond immediately to urgent requests during our routine hours. Urgent

specimens should be packaged in our red colored marked as Urgent packaging specimen bags. It is ESSENTIAL to tick the urgent box on the request form and that contact details are provided for results to be telephoned, faxed or emailed when required. For urgent specimen collection, please phone our service line as stated above. During ***On-Call Hours***, our laboratory will only respond to urgent tests. An extra ***RM 4.00 Surcharge*** for urgent tests will be charged per case sent within On-Call Hours. If Sunday collection for non-urgent or routine tests, pre-arrangement is needed, please contact your service branch or service representative for such arrangements.
If immediate delivery of specimens to the laboratory is unavailable, please keep the specimens at a ***suitable temperature***, refer to pages 30 to 33.

2.10 Add-on Test by Verbal Order
Verbal order of adding "tag-on tests" to an old specimen is **acceptable**
The ordering clinician can call the laboratory to check sample availability, suitability and place a verbal order, but must sign a supplementary Test Requisition Form and submit it to the laboratory

An ***additional*** or ***follow-up test*** can be ordered on a previously submitted specimen, provided
- there is sufficient specimen volume and
- the specimen is still usable.

written verification must be provided by filling out the Test Request Form again with an appropriate note and fax or courier to the laboratory.

.2.11 Cancellation of test request
The laboratory will accept requests for ***test cancellation*** received before test set-up at no charge.
Cancellation requests received after test set-up
cannot be honoured;
the test will be performed, a report will be issued, and the client will be charged appropriately
2.12 Laboratory Rejection Criteria
The following criteria will be used to consider a sample is unacceptable and will be rejected.
Incompletely filled or no sample identify on the Test Requisition Form
Sample without accompanying Test Requisition Form
Sample without any label
Discrepancy in patient's identity between the Test Requisition Form and sample label
Inappropriate test sample, e.g. wrong use of container/preservative or anticoagulant
Leaking specimen containerGrossly haemolysed sample

2.11. Turnaround time for the tests (refer to List of tests provided by Genosis Lab)

	Type of test	TAT (working day)
Urgent	FBC, spot/rapid test for infection (Dengue, ASOT & WWF), common biochemistry (Liver Function Tests, Renal Function Tests, Glucose), Urine FEME, etc	Same day* or 1 day * Surcharge may apply
Routine	Common test for biochemistry, hormones, serology & tumour markers; Culture, routine coagulation tests, cytology & histology, etc.	1 to 5 days
Esoteric	Special hormones/proteins & serology, molecular diagnostic, AFB culture, etc.	7 days or more

3.0 BLOOD SAMPLE COLLECTION

3.1 Wash Hands Before Venipuncture

3.2 Before sample collection,

a) Correct patient identification before specimen collection is extremely important.
b) Verify the identity of the patient with at least 2 identifiers (i.e., patient's name and IC/ passport number).
c) Identify the patient using two different identifiers, asking open-ended questions such as, "What is your name?" and "What is your date of birth?"
d) Check the requisition form for requested tests, patient information, and any special requirements and select specimen containers according to the test requests
e) Verify that the patient meets preexamination requirements where relevant [e.g., fasting status, medication status (time of last dose, cessation), sample collection at predetermined time or time intervals].
f) Obtain patient's consent if indicated.
g) Patient comfort. Is the seating comfortable, and has the patient been seated for at least 5 minutes to avoid being rushed or confused?

3.3 Blood sample collection (Order of draw for blood specimens)

Laboratory tests are performed on anti-coagulated whole blood, plasma or serum.
The following order of draw is recommended when drawing multiple samples for laboratory testing during a single venipuncture. It is to avoid cross-contamination from tube additives.

- Blood culture tube
- Coagulation tube (e.g. blue closure)
- Serum tube with or without clot activator, with or without gel (e.g. red closure)
- Heparin tube with or without gel plasma separator (e.g. green closure)
- EDTA (e.g. lavender closure)
- Glycolytic inhibitor (e.g. grey closure)

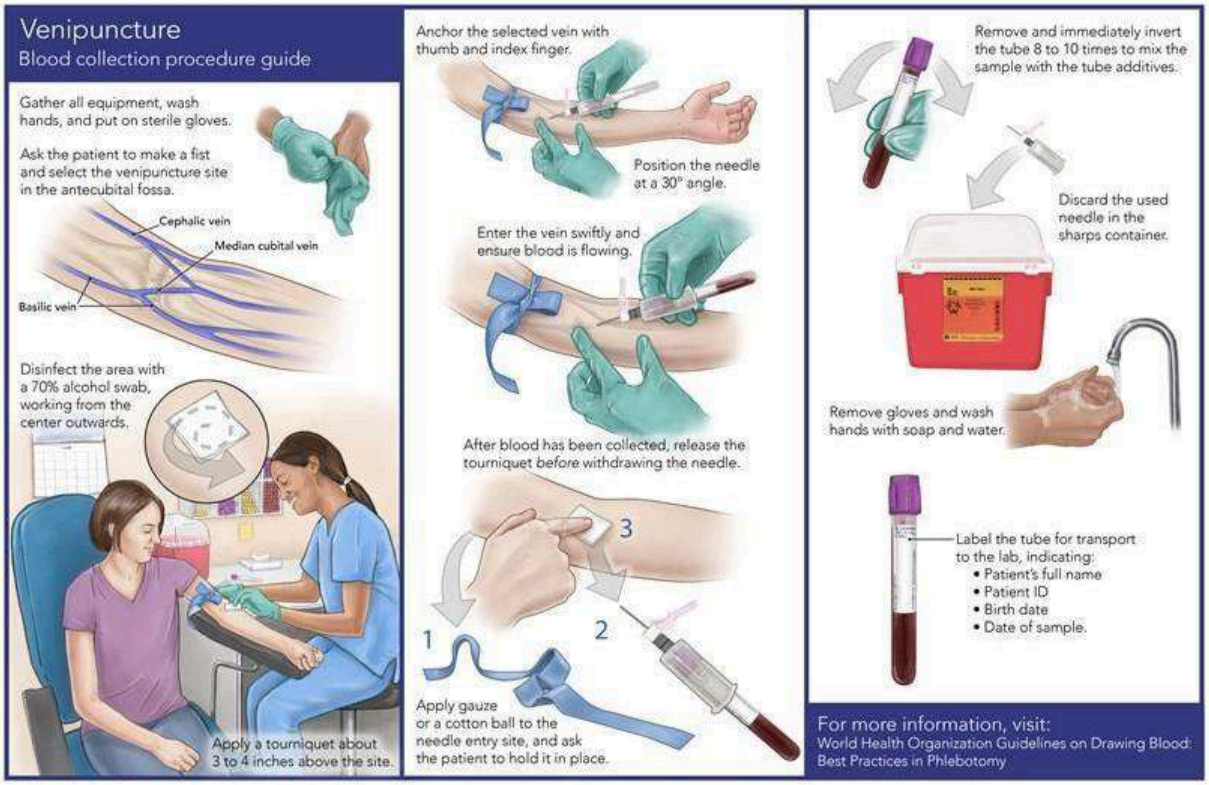
Blood collection tubes must be drawn in a specific order to avoid cross-contamination of additives between tubes. The recommended order of draw for plastic vacutainer tubes is as below

Order of Draw

Tube Closure Color	Collection Tube	Mix by Inverting	Min. Clot Time
	Blood Cultures – SPS	8 to 10 times	N/A
	Citrate Tube (Light Blue)	3 to 4 times	N/A
	Serum Separator Tubes (Gold and Tiger)	5 times	30 minutes
	Serum Tube (Red)	5 times (plastic) None (glass)	60 minutes
	Rapid Serum Tube (Orange)	5 to 6 times	5 minutes
	Plasma Separator Tube	8 to 10 times	N/A
	Heparin Tube (Green)	8 to 10 times	N/A
	EDTA Tube (Lavender)	8 to 10 times	N/A
	PPT Separator Tube (Pearl)	8 to 10 times	N/A
	Fluoride Tube (Gray)	8 to 10 times	N/A

NOTE: Tubes with additives must be thoroughly mixed.
Erroneous test results may be obtained when the blood is not thoroughly mixed with the additive

3.4 Venipuncture – Blood Collection Procedure



a) Carry out hand hygiene before and after each patient procedure, before putting on and after removing gloves.
b) Select a suitable site for venipuncture. Avoid drawing blood below or from the infusion side to prevent dilution of the blood specimen..
c) Collect the sample into appropriate tubes or containers (refer to 3.1 Type of Vacutainer Tubes)
d) To avoid cross-contamination of additives between tubes, blood must be filled into the tubes in a specific order (refer table order of draw).
e) Let the vacuum in the tube fill the blood up to its level. Do not press the syringe plunger as this will lead to hemolysis.
f) Gently invert the tube 5-10 times
g) Label the collection tubes at the bedside or drawing area. Do not pre-label the empty specimen containers before attending to the patient.
h) The label should include at least 2 identifications, e.g. the patient's full name, MRN, NRIC or DOB. (Refer to labelling the sample)
i) The date and time of collection must be indicated on the Test Requisition Form.
j) Place specimens in the inner pocket of the specimen carrier bag and seal the zip.
k) Place the Test Requisition Form in the outer pocket of the specimen carrier bag.
l) Promptly send the specimens with the Test Requisition Form to the laboratory

3.5 Factors that can reliability and accuracy of the test results

Proper collection is essential to provide accurate results for patient care and management. The quality of the sample provided will determine the quality, reliability and accuracy of the test results. The table below shows common factors that can interfere with testing.

Factors	Significance and Precautions
Hemolysis	- Potassium, folate, bilirubin, AST, ALT, LDH, CK, Mg, phosphate, certain FBC parameters, and coagulation tests are markedly affected by hemolysis. - <u>To minimise hemolysis</u>: - Use a 20-22 gauge needle for routine collection. Too small a needle results in excess force, while too large a needle can cause stress on the cell walls. Avoid using narrow-gauge 'butterfly' needles where possible - Do not leave the tourniquet on for longer than three minutes. The longer the tourniquet remains on the arm, the higher the incidence of haemolysis - Warm up the puncture site. Warming increases blood flow and prevents the need to "milk" the site. - Fill tubes to the correct volume. Underfilling tubes containing anticoagulant results in a higher than recommended concentration of the additive, which promotes haemolysis. Use a smaller tube for difficult draws - Avoid transferring blood between tubes whenever possible. If you must, don't push hard on the syringe plunger, as this causes excess pressure and can also cause loss of the sample if the stopper comes off. - When using a syringe, pull the plunger gently. Pulling too quickly exerts excess pressure and will rupture the cell walls. - Place the needle correctly in the vein. If the bevel of the needle is crowded by the inner wall of the vein, this exerts force on the cells. This is typically indicated by too slow a blood flow - Avoid extreme temperatures. Never place a blood sample (blood gases, ammonia, and lactate) directly on ice, as this may cause hemolysis. - Do not shake or vigorously mix a blood specimen after collection to prevent hemolysis
Contamination	- Contamination of a blood sample may lead to an incorrect result. - Avoid taking blood from the site where an IV infusion has been set up. It can cause a dilution effect for most analytes. Depending on the type of IV infusion, it may lead to an increase in glucose, sodium, chloride, and potassium levels. - Avoid decanting blood from one sample tube to another, even if the tubes contain the same anticoagulant. - Follow the recommended 'order of draw' to avoid contamination. Example: K+EDTA contamination may lead to ❖ Falsely prolonged PT/APTT or low fibrinogen results in coagulation tests. ❖ Severely affects potassium, calcium, and ALP in chemistry tests (serum separator tubes, SST)
Venous Constriction	Vigorous constriction can severely affect calcium, lactate, electrolytes, and proteins. Avoid prolonged tourniquet application
Delay in transporting Samples (>4hrs)	- It may affect these analytes (potassium and coagulation testing), as it causes degradation of platelets, RBC, and WBC. - Suggest sending samples as soon as possible to the laboratory
Icterus	- May affect these analytes (creatinine, cholesterol, ammonia, triglycerides, D Dimer, FBC test (Haemoglobin, MCH, MCHC) and coagulation tests). - Results should be interpreted with caution

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Factors	Significance and Precautions
Lipemic	May affect these analytes (sodium, ammonia, ALT, AST, salicylate, D Dimer, FBC test (Haemoglobin, MCH, MCHC) and coagulation tests). Results should be interpreted with caution.

Blood Collection or Handling Technique	Potential Error	Correct Procedure
Not allowing alcohol to air dry after cleansing the venipuncture site	- The introduction of alcohol into the specimen may cause hemolysis.	● Allow alcohol to completely air dry on skin before drawing the sample.
Not following the order of draw	- Contamination from other additives could interfere with test results. - Plastic or glass serum tubes containing a clot activator may cause interference in coagulation testing.	● Always follow correct order of draw.
Improper mixing, including inadequate mixing or vigorously shaking tube after collection	- Vigorous shaking of tubes can cause hemolysis. - Inadequate mixing can cause clotting or presence of clots	Gently invert tubes the specified number of times immediately after draw: Blue top (Sodium citrate) 3 to 4 times. All other tubes (including light green/mint (PST) and lavender (EDTA) 8 to 10 times.
Under-filling or over-filling tubes	- The ratio of blood to additive is altered which can cause incorrect test results. - Examples: - Under-filling blue top sodium citrate tubes for coagulation testing can drastically alter results. - Over or under-filling blood culture bottles can result in false negative results.	Allow tube to completely fill so vacuum is exhausted. Exception is blood cultures: allow the required amount of blood to enter bottle, using guide lines marked on bottle to determine fill. For correctly filled blue top sodium citrate tubes which contain a liquid anticoagulant, the ratio of blood to anticoagulant is 9:1, which is important for accurate test results.

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Combining two partially filled tubes, or filling one type of tube from another type of tube	If two different types of tube are used (e.g. lavender top into SST tube), incorrect additives can interfere with test results. If the same type of tube is used, the ratio of blood to additive is altered which can cause incorrect test results. Opening tubes can change the pH of the specimen which may affect the stability of the specimen and test result. In addition, opening tubes of blood without the use of protective equipment is a safety risk due to the possible production of aerosols or spillage.	Never combine two tubes. If blood stops flowing into the first tube before adequate volume is collected, collect a new tube. Leave tube lids on to maintain stability for some tests.

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Blood Collection or Handling Technique	**Potential Error**	**Correct Procedure**
Using a partially filled tube when attempting another venipuncture.	Loss of vacuum can cause insufficient draw. Delay in mixing sample may cause clotting of specimen.	Always use a new tube when performing a second venipuncture.
Leaving tourniquet on longer than one minute	Prolonged tourniquet application may result in hemoconcentration and erroneously increased levels of protein based analytes, packed cell volume, or other cellular elements.	Do not leave tourniquet on for longer than one minute; remove as soon as possible after the blood begins to flow.
Using a winged collection device (butterfly) and not removing air in tubing when blue top sodium citrate tube for coagulation is the first tube collected	Air in the tubing will reduce the amount of blood drawn and alter the blood to anticoagulant ratio, and can cause incorrect test results.	Use a discard tube (either another blue top sodium citrate tube or a BD discard tube) to remove the air from the tubing, before collecting specimen into the blue top tube.
Delay in separation of serum or plasma due to overnight storage or delay in transit	Potentially caused of hemolysis	Arrange courier pick up as soon as possible according to test requirement.
Photolabile analytes (Specimen not protected with aluminum foil wrap/equivalent)	Low Folate, Vitamin B12, Porphyrins Neonatal Bilirubin, Vitamin A	Wrap with aluminum foil during transit and before test run.
Clots in anticoagulated blood due to difficult venipuncture or specimens not mixed well	Shortened PT Spurious results in FBC, ABG, Cyclosporin, hormones and other assays requiring whole blood specimens	Avoid prolong venipuncture period and mix specimen well.
Specimens not chilled or sent to the laboratory immediately	Spurious results in Ammonia (NH_3), Lactate, Pyruvate, ABG, Gastrin, Parathyroid Hormone (iPTH), Adrenocorticotropic Hormone (ACTH), Renin and complement. May not identify Chlamydia, amoeba and some microorganisms because of poor viability	Keep the specimens at required temperature before picking up by lab.
Avoid using syringe to manually inject blood into vacuum tubes without taking off the needle.	Increase the risk of blood hemolysis.	Using the vacuum needles for blood withdrawal directly into vacuum tube. If using syringe, do not manual inject blood into vacuum tube.

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3.6 Serum Indices – A Tool to Measure Interfering Substances in Blood Samples

Serum Indices are intended for use as part of laboratory practice to monitor the instrument response to detect hemolyzed, icteric, or lipemic samples. Hemolysis, icterus, and lipemia (HIL) are the most commonly tested interferences that may affect the integrity of patient samples.

The flags indicated in report characterize the kind of chromatic substance (LIP: Lipaema/turbidity, ICT: Bilirubin and HEM: Haemoglobin) and approximate concentration of the interferent as in the following table:

Flag	LIP (mg/dL Intralipid)	ICT (mg/dL Bilirubin)	HEM (mg/dL Hemoglobin)
N	< 40	< 2.5	< 50
+	40 – 99	2.5 – 4.9	50 – 99
++	100 – 199	5.0 – 9.9	100 – 199
+++	200 – 299	10 – 19.9	200 – 299
++++	300 - 500	20 – 40	300 – 500
+++++	> 500	>40	>500

Kindly refer to the table below for Hemolysis, icterus, and lipemia (HIL) toleration level for each test.

Assay	Lipid interference		Icterus interference		Hemolysis interference		Remark
	mg/dL	Flag	mg/dL	Flag	mg/dL	Flag	
Cortisol	1800	+ + + + +	10	+ + +	500	+ + + +	
Ferritin	900	+ + + + +	5	++	300	+ + + +	
Folate	1800	+ + + + +	10	+ + +	Avoid	Not Applicable	Do not use hemolyzed samples. The folate level in red cells is much greater than that of the serum or plasma (heparin), leading to spuriously high results
Vitamin B12	1800	+ + + + +	10	+ + +	Avoid	Not Applicable	
iPTH	3000	+ + + + +	20	+ + + +	500	+ + + +	
Vitamin D	3280	+ + + + +	40	+ + + +	50	+ +	Avoid hemolysed samples
hs-Troponin I	3000	+ + + + +	40	+ + + +	400	+ + + +	
Insulin	1800	+ + + + +	10	+ + +	Avoid	Not Applicable	Hemolysis releases enzymes which degrade insulin
AMH	666	+ + + + +	43	+ + + + +	300	+ + + +	
DHEAS	1750	+ + + + +	30	+ + + +	1000	+ + + + +	
FSH	1800	+ + + + +	10	+ + +	1000	+ + + + +	
LH	1800	+ + + + +	10	+ + +	300	+ + + +	
PAPP-A	3000	+ + + + +	40	+ + + +	500	+ + + +	
Progesterone	450	+ + + +	5	++	500	+ + + +	
Prolactin	1800	+ + + + +	10	+ + +	500	+ + + +	
SNSE2	666	+ + + + +	40	+ + + +	300	+ + + +	
SHBG	5000	+ + + + +	30	+ + + +	400	+ + + +	
β-HCG	3000	+ + + + +	40	+ + + +	500	+ + + +	
Testosterone	1800	+ + + + +	10	+ + +	1000	+ + + + +	

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Assay	Lipid interference		Icterus interference		Hemolysis interference		Remark
	mg/dL	Flag	mg/dL	Flag	mg/dL	Flag	
Estradiol	1800	+ + + + +	20	+ + + +	500	+ + + +	
AFP	520	+ + + + +	25	+ + + +	1200	+ + + + +	
CA153	3000	+ + + + +	40	+ + + +	500	+ + + +	
CEA	1800	+ + + + +	30	+ + + +	500	+ + + +	
Free PSA	1500	+ + + + +	20	+ + + +	500	+ + + +	
CA199	1000	+ + + + +	60	+ + + + +	50	+ +	
CA125	1800	+ + + + +	20	+ + + +	1000	+ + + + +	
PSA	1500	+ + + + +	20	+ + + +	500	+ + + +	

Adopted from respective reagent insert.

Assay	Lipaemic interference		Icterus interference		Hemolysis interference		Remark
	mg/dL	Flag	mg/dL	Flag	mg/dL	Flag	
Albumin BCG	800	+++++	40	+++++	450	+++++	
ALP	100	+++++	28	++++	450	+++++	
ALT	300	+++++	40	+++++	500	+++++	
Amylase	1000	+++++	40	+++++	500	+++++	
AST	300	+++++	40	+++++		+	
Calcium Arsenazo	1000	+++++	40	+++++	500	+++++	
Creatinine Enzymatic	600	+++++	40	+++++	500	+++++	
Cholesterol	1000	+++++	8	++	500	++++	
Creatinine	600	+++++	40	+++++	500	+++++	
DDimer	700	+++++	40	+++++	500	+++++	
Direct Bilirubin	300	+++++		+++++		+	
GGT	1000	+++++	40	+++++	250	+++++	
Glucose	700	++++	40	++++	500	+++++	
HBA1C (B00389)	500	+++++	30	+++++		+++++	
HDL-C	900	+++++	40	+++++	500	+++++	
Iron	100	+	40	+++++	100	+	
LDL-R	1000	++++	40	+++++	500	+++++	
Magnesium	200	++	28	++++	150	++	
Phosphorus	800	+++++	40	+++++	Avoid	+	Hemolysis must be avoided as Phosphate may be split off from labile esters in the erythrocytes.
Total Bilirubin	1000	+++++		+++++	45	+	
Total Protein	1000	+++++	24	+++	300	+++	
Transferrin	1000	+++++	40	+++++	500	+++++	
Urea	500	+++++	20	+++	250	+++++	
Uric Acid	1000	+++++	40	+++++	500	+++++	

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Assay	Lipaemic interference		Icterus interference		Hemolysis interference		Remark
	mg/dL	Flag	mg/dL	Flag	mg/dL	Flag	
Triglyceride	1000	+++++	40	+++++	500	+++++	Grossly lipemic samples under rare circumstances may evade the Data Check Parameters (Flag: F, Z, @, &) and should routinely be diluted 1 part sample to 4 parts saline prior to analysis, and the results multiplied by 5.
HsCRP	1000	+++++	40	+++++	500	+++++	
*Apo A1	900	+++++	40	+++++	500	+++++	
Apo B	200	+++	40	+++++	500	+++++	
RF	750	+++++	40	+++++	500	+++++	
CHE	1000	+++++	40	+++++	500	+++++	
CK	1000	+++++	40	+++++	500	+++++	
LDH	1000	+++++	40	+++++		+	
Na	500	+++++	40	+++++	500	+++++	
K	500	+++++	40	+++++	50	+	
CL	500	+++++	40	+++++	500	+++++	

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4.0 SPECIAL SPECIMEN COLLECTION PROCEDURES FOR BIOCHEMISTRY TESTS

4.1 24-HOUR URINE COLLECTION

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Most quantitative assays are performed on a urine specimen collected over 24 hours. The 24-hour Timing allows for circadian rhythmic changes in excretion at certain times of day.

Procedure of collection:

a) The 24-hour urine bottle, which contains a preservative for the required test, is available at The Genosis Lab/branches and provided on request, with the accompanying request form or note.

b) On the day of collection, the first urine voided must be thrown away. Time of first urine voided is the start of the timing for the 24-hour collection.
c) Collect the second and subsequent voided urine for 24 hours from the timed start into the 24-hour urine bottle.
d) For a male patient, it is advisable NOT to void the urine directly into the 24-hour urine bottle. This is to avoid possible chemical burns.
e) At the end of 24 hours, the last urine voided is collected. For the best result, refrigerate the sample.
f) Label the bottle as directed and send immediately to the laboratory.

Examples of the tests: 24-hours urine cortisol and 24-hours urine catecholamine

4.2 24-HOUR URINE COLLECTION for CATECHOLAMINES

a) Please refer to the procedure for 24-hour urine collection to collect urine for 24-hour urine catecholamines.
b) Please note that 10 ml of 25% HCl is added to the bottle to preserve the analytes. It is
c) important for the requesting physician to advise the patient NOT to discard the
d) preservative.
e) Instructions on patient preparation and specimen collection:
   - Abstain from bananas, coffee, pineapple and walnuts one day before and during the 24-hour urine collection.
   - Certain drugs alter the metabolism of catecholamines. It is advisable to stop such medications at least one day before urine sampling. The medications include: Alpha2 agonists, Calcium channel blockers, ACE inhibitors, Bromocriptine, Methyldopa, Monoamine oxidase inhibitors, Alpha blockers and Beta blockers, Phenothiazines and Tricyclic antidepressants.

f) Please advise the patient to avoid stress, exercise, and smoking before and during urine collection.

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Patient Information Sheet
24 hour urine collection

Please read and follow these instructions carefully.

- You must use the collection bottle provided by Gnosis Laboratories
- ***Do not*** discard or touch any of the preservatives in the bottle.
- Keep the lid on tight

Collecting the specimen
Drink your normal amount of fluids during the 24 hours

Day 1

- When you get up (e.g. 7:30 am) pass urine into the toilet.
- Do **not** collect the first urine
- Please collect the subsequent urine you void throughout the day and night.
- In the collection bottle
- Write the **date, time, your name and IC No**. on the collection bottle label.

Collect ALL urine for 24 hours

- Use a clean plastic container
- Pour the urine into the collection bottle
- Store the specimen in a cool place

Rinse the plastic container after each use.

Day 2

- Collect only the first morning sample of urine when you get up (e.g. 7:30am).
- Add it to the collection bottle
- This is the end of the 24-hour collection. Write the **date and time** on the label.

Delivering the specimen

Deliver the specimen promptly to your Gnosis Laboratory (HQ) or nearest Gnosis branch

Your results

Your doctor will advise you when the results are available

5.0 SPECIMEN COLLECTION FOR MICROBIOLOGY TEST

5.1 General Guidelines for Proper Specimen Collection and Transport

a) Specimens shall be collected before administering antimicrobial agents, where possible.
b) Use sterile containers and aseptic technique to collect specimens.
c) Collect an adequate amount of specimens. Inadequate amounts of specimens may affect the accuracy of test results.
d) Swabs shall be transported in suitable media.
e) Specimens collected by using needle aspiration should be transferred to a sterile container and transported to the laboratory as soon as possible. If there is only a small volume of
Add sterile saline to the material in the syringe, mix well, and then transfer it to a sterile container.
f) All specimens from high-risk patients (HIV, Hep B, TB, and others) must be marked as high risk.
g) The specimen container must be properly labelled, placed in a biohazard plastic bag and accompanied by a completed laboratory Test Requisition Form.
h) Specimens should be transported to the laboratory s o o n e s t p o s s i b l e and preferably within the same day.

Special Instructions

5.2 Urine Culture

a) Sterile container

A clean mid-stream Urine for culture should be collected in a sterile 90mL urine container and refrigerated while waiting for specimen pick up from the laboratory.

b) Labelling Requirement on the Specimen container

Provide information as required in the label of the urine container, such as full name, IC Number, source of specimen and date and time of collection.

c) Request form

- The patient's full name, I.C. Number, source of specimen and date and time of collection should be specified on the Test Requisition Form and the urine container.
- Relevant information, such as pregnancy, antibiotic medication, drug allergies, etc., shall be indicated in the requisition form.

d) Collection of a Mid-stream Urine Sample

- Urine collected at any time of the day is acceptable, preferably an early morning urine specimen.
- Provide the following instructions to the patient:
  - Wash and dry your hands thoroughly.
  - Remove the container lid. Do not touch the inner surfaces of the container.
  - Wash your urogenital area (“lower parts”) with the towelette
  - For women, wipe from front to back between the folds of skin
  - For men, retract the foreskin (if uncircumcised), and clean the glans (head of the penis)
  - Pass a small amount of urine into the toilet (a woman needs to hold the skin folds apart) and then, midway through urination, urinate into the container.
  - The container should only be 1/2 to 2/3 full.
  - A specimen that contains stool, vaginal discharge, or menstrual blood cannot be used.
  - Replace the lid and tighten firmly.
  - Wash and dry your hands thoroughly.
  - Immediately refrigerate the specimen and send it to the laboratory within 24 hours. Urine specimens shall be maintained at 2- 8 °C during transportation. Call the laboratory for further advice if the specimen is expected to be collected more than 24 hours.

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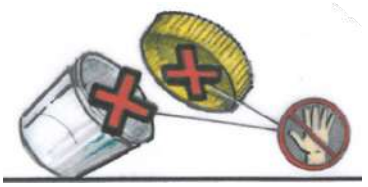
Patient Information Sheet
Mid -stream urine collection

Introduction
The purpose of this leaflet is to explain how adults should collect a midstream urine (MSU) sample (specimen).

What is a midstream urine sample?

a) Urine is normally sterile, so if bacteria is present, it means that there is an infection.
b) A midstream urine (MSU) sample is used to confirm a diagnosis of a urine infection, and the best antibiotics to prescribe to treat the infection.
c) An MSU sample describes the middle part of your urine flow; you do not collect the first or last part of urine flow. By collecting the middle part of the flow of urine, the risk of the sample being contaminated with bacteria from your hands or skin around the urethra (the tube that carries urine out of the body) is reduced.

How to collect a Mid-stream urine sample

Wash hands with soap and water, rinse and dry hands	
Remove the lid from the collection container and set it aside. Avoid touching the inside of the collection container and lid.	
Void (pee) a small portion of urine into the toilet. Momentarily stop the urine flow, then resume the flow and collect a portion of the urine into the container **Instructions for women:** It is advised to hold open the labia (entrance to the vagina) and pass some urine into the toilet (about 15 to 30 ml). Then, without stopping the flow of urine, pass urine into the sterile urine container **Instructions for men:** 1. Retract the foreskin. 2. Pass the first part of the stream of urine (about 15 to 30 ml) into a urinal, toilet or bedpan/bottle. 3. Place the sterile urine container (into the urine stream without interrupting the flow. Collect the mid-stream part of the urine. Continue the remaining part of the urine stream into the toilet	 
Tightly secure the lid	
Wash hands thoroughly	
Write the date and time of collection on the urine container(s) label and on the laboratory request form.	
If collecting at home and delay is unavoidable, keep the specimen in the refrigerator and bring it to the	

laboratory as soon as possible.

5.3 Blood Culture

Aseptic technique shall be in practice, which is critical for proper blood culture collection. Source of blood collection: Venous blood

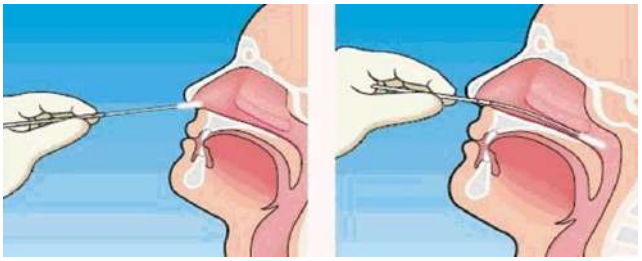
Acute Sepsis: Collect **two or three** sets of culture from **separately prepared sites** before initiating antimicrobial therapy. Each set consists of two bottles, one aerobic and one anaerobic or two aerobic.

Acute Endocarditis:
Obtain **three** blood cultures from **separate venipuncture sites** over 1 – 2 hours, before initiating therapy. These cultures are often obtained **30 minutes apart** to document persistent bacteremia.
Subacute Endocarditis:
Obtain **three** blood cultures on **day 1** (15 minutes or more apart). If cultures are negative after 24 hours, obtain 3 more.

Adults: **10 ml** of blood per culture bottle. In the event that **less** than 10 ml of blood is obtained from an adult, put it all into **one aerobic** blood culture bottle.

Children and infants: **1 – 3 ml** of blood per culture bottle. The minimum volume is dependent upon the weight of the child/infant, Please contact the microbiology department before obtaining the blood if assistance is needed in determining the correct amount of blood needed for the child/infant.

5.4 Nasal Swab



Nasopharyngeal Swab Procedure

a) Wear a surgical mask and disposable gloves.
b) Wash hands thoroughly with soap and water or alcohol-based hand gel (before and after the procedure)
c) Remove the patient's surgical mask to perform the procedure and replace it with a new one when done.
d) Use a flexible, fine-shafted aluminum swab with a polyester tip.
e) The distance from the patient's nose to the ear gives an estimate of the distance the swab should be inserted.
f) Insert the swab into one nostril down and backwards into the nasopharynx and leave in place for a few seconds.
g) Slowly withdraw the swab with a rotating motion.
h) Place the tip of the swab into a vial containing 2–3 ml of Viral Transport Medium and cut the shaft.
i) Dispose of all PPE and other contaminated materials in the trash.
j) Storage Condition
k) Specimens can be kept refrigerated at **4ºC for up to 72 hours**
l) Specimens that cannot be processed within 48-72 hours should be kept in the refrigerator at **4ºC.**

5.5 Genital Tract Swabs

Clinical indication

Genital Infections, Sexually Transmitted Diseases,

Specimen Required

Female: Cervical or High vaginal swabs, Urethral swabs
Male: Urethral swab, penile swab

Method for collection

Cervical or High vaginal swabs

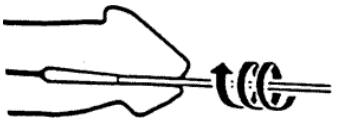
Use a speculum to take Cervical and high vaginal swabs.
Avoid vulvar contamination of the swab.
High Vaginal Swabs
Roll firmly t h e s wab over the surface of the vaginal vault. Then place the swab in the transport medium.

Cervical Swabs

Rotate e sw a b inside the endocervix. The swab should then be placed in the transport medium.

Urethral Swabs

a) Practice aseptic technique to avoid contamination with microorganisms from the vulva or the foreskin. Thin swabs are available for the collection of specimens.
b) The patient should not have passed urine for at least 1 hour.
c) The swab is gently passed through the urethral meatus and rotated. Place the swab in the transport medium.



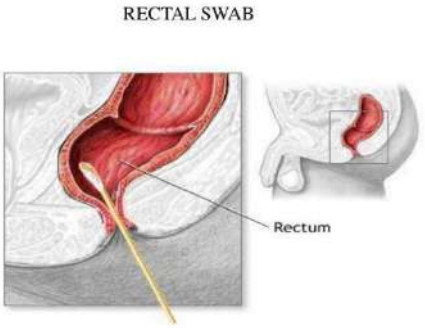
Intrauterine Contraceptive Devices (IUCDs)

The entire device should be sent in a sterile universal container.

5.6 Rectal Swabs

a) Rectal swabs should be taken via a proctoscope.
b) Advantages of rectal swabs:
   Convenient
   - Adapted to small children, debilitated patients and other situations where a voided stool sample is not feasible

c) Drawbacks of rectal swabs:
- No macroscopic assessment possible
- Less material available
- Not recommended for viruses



5.7 Pus Samples/ Wound Swabs

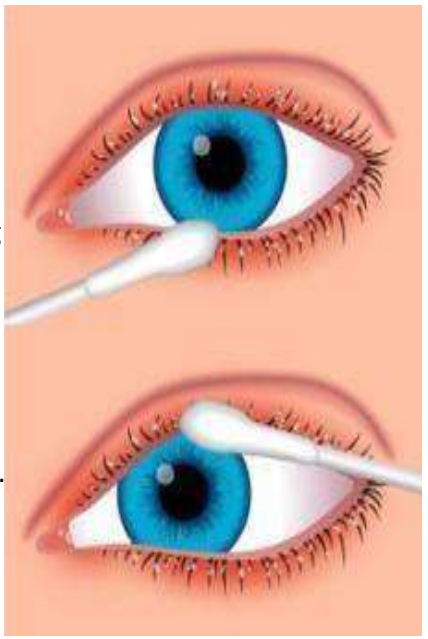
a) Wound swabs should only be taken when signs of clinical infection are relevant.
b) Wound or Pus samples are screened for all likely bacterial pathogens, and if present, these organisms and their antibiotic sensitivity results will be reported. The inclusion of relevant clinical information on the Test Requisition Form will assist in determining the bacterial isolates.
c) Please indicate clearly on the requisition form and the swab site of the wound to facilitate interpretation of culture results.
d) Specimens Required
Pus sample (preferably to a wound or pus swab) in a sterile container.
Wound swab in transport medium.

5.8 Abscess

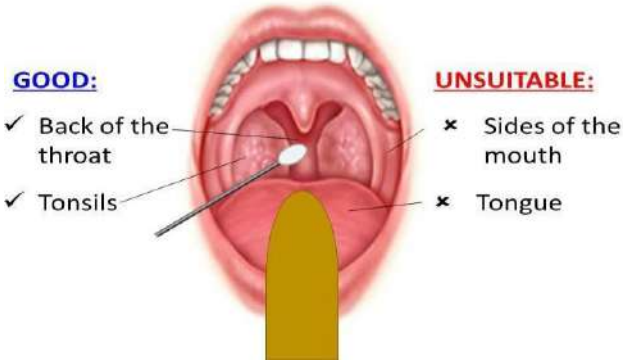
a) Decontaminate the surface with 70-95% alcohol and 1-2% tincture of iodine.
b) Collect the purulent material aseptically from an undrained abscess, using a **sterile needle and syringe**.
c) Open abscesses with a sterile scalpel and collect the expressed material with a sterile needle and syringe.
d) Transfer 5-10 ml of the aspirated material to an **anaerobic** transport vial. Transport immediately. *Anaerobic transport media is **not recommended** for AFB culture. If requesting AFB culture, transfer at least 1 ml of the aspirated material into a sterile container.*
e) **Swabs are not recommended** because
- They dry easily because of the limited amount of material obtained.
- Swabs are not optimal for fungal, anaerobic cultures, or decubitus ulcers.
- Swabs are **not** accepted for mycobacterial cultures, perirectal abscesses, or oral abscesses.
- Gram stains cannot be provided from a single swab. If a Gram stain is needed, collect two swabs.

5.9 Eye Swab

a) Explain the procedure and the purpose of the investigation to the patient to obtain informed consent, gain cooperation, and allay any fears and anxieties.
b) Sit or lie the patient with head well-supported and with the chair at an appropriate height to ensure safety for the patient and the nurse.
c) Perform hand washing to reduce the risk of cross-infection
d) Ask the patient to look up and gently pull down the lower lid, exposing the conjunctiva.
e) Gently sweep the swab stick along the lower fornix, from inner to outer canthus. Do not touch the eyelids.
f) Swab I s p l a c e d immediately into the bacterial medium container.
g) Ask the patient to close the eye for a few seconds. This will ensure a safe technique of swab taking and avoid damage to the cornea.
h) Repeat the procedure on the other eye with a separate swab, if needed.
i) Wash hands in between to minimize the risk of contamination of the other eye.



5.10 Throat Swab



a) Hold the tongue away with a tongue depressor.
b) Locate areas of inflammation and exudate in the posterior pharynx, tonsillar region of the throat behind the Uvula.
c) Avoid swabbing the soft palate.
d) Do not touch the tongue.
e) Rub the affected area back and forth with a swab

5.11 Sputum Collection

Instructions to the patient:

a) Gargle or rinse mouth with water.
b) Instruct the patient to cough deeply to produce a specimen from the lower respiratory tract and not saliva.
c) Collect in a plain sterile container, with a sufficient amount depending on the number of tests requested if > 24 hours, refrigerate at 4 to 8°c

6.0 SPECIAL PROCEDURES FOR HISTOPATHOLOGY AND CYTOLOGY TEST

6.1 **Histopathology**

Use separate Histopathology and Cytology request forms for the same patient.

Specimen Container Guidelines

a) Use preferably transparent containers so that laboratory and other staff can see and verify the specimen without having to open the cap.
b) Size is adequate so that it has enough capacity to hold the specimen, with at least three times its volume of fixative.
c) Containers should be appropriately labelled and tally with the Test Requisition Form.

Fixative

a) **10% buffered neutral formalin** solution is recommended for routine fixation. For large specimens, please cut open the tissue to facilitate penetration of the fixative. Formalin usually does not penetrate tissues for more than a depth of about 1.0cm.

b) Tissues not placed in fixatives will undergo **autolysis**. Ly sed blood could be seen in the solution. The tissue will n ot change dull chocolate brown. Please transfer the specimen to formalin fixative if this is occurring.

Small Biopsies

a) Punch biopsies (endoscopic, bronchoscopy and trucut biopsies, aspiration biopsies, etc) are preferably mounted on pieces of paper before placing them in the fixative. This helps to reduce tissue loss and damage.

b) If incisional biopsies are done, try to obtain wedges of tissue instead of irregular fragments. Irregular fragments are difficult to orient and interpret. In general, the larger the lesion, the bigger the incisional biopsy specimen.

c) Biopsies from multiple sites should be placed in different containers.

6.2 **Gynaecological Pap Smears (Pap Test)**

Indication

The Pap smear is primarily for the detection of cervical premalignant and malignant changes and should not be relied upon to detect endometrial malignancy.

a) Label the slide with at least 2 identifiers (e.g. patient's name, IC, passport number or MRN).
b) Smear preparations shall be fixed immediately after collection:
c) Fixative
   Duration
   95% ethyl alcohol, 15 – 30 minutes
   spray fixatives, 10 minutes
d) Fixed smears should be allowed to dry for 10 minutes before placing them into the slide carrier for dispatch to the laboratory.
e) Submit to the laboratory using one test requisition form.
f) Patient Preparation
   - Do not use a vaginal douche or topical vaginal medications for 48 hours before examination.
   - Do not have sexual intercourse for 24 hours before examination.
   - Schedule examination 14 days after the onset of the last menstrual period.

Method for specimen collection

a) Collect a sample with a spatula, followed by the cytobrush.
b) Use the spatula for scraping the ectocervix. The brush specimen should be in addition to, never instead of, the ectocervical scraping.
c) Smears should be made with **one or two swipes** of the spatula on the slide, not with a mixing motion. The cytobrush should be **rolled** on the slide.
d) The smears should be fixed immediately to avoid air-drying. If an aerosol spray is used, the spray nozzle should be about **twelve inches** from the slide. If held too close, the spray "freezes" the cells and also lifts them from the slide, causing them to clump.
e) It is important that clinical information is also included, as it helps in the interpretation of the specimen.

Adequacy of Smears

Smears may be unsatisfactory for reporting due to the following:

a) The presence of an endocervical component (endocervical or metaplastic cells) is generally considered necessary to classify a smear as a satisfactory specimen.
b) However, we have found positive smears even in the absence of an endocervical component and the data available is not conclusive as to whether the absence of an endocervical component will increase the risk of a false negative smear.
c) In addition, some smears are also taken without sampling of the endocervical canal and are not expected to contain an endocervical component. Hence, we may report PAP smears without an endocervical component as satisfactory, but the absence of this component will be recorded in the report.
d) Unsatisfactory smear criteria
   - Inadequate cells in the smear
   - **Too thick a smear**
   - Too much blood, secretions or contaminating lubricants in the smear
   - Too many inflammatory cells
   - Too many crushed artefacts
   - Poorly fixed smears or severe air drying artefacts

For Urine, body cavity fluids, cerebrospinal fluids and secretions,

a) if delivery to the laboratory is not immediate, the specimen should be refrigerated or transported in a cold chain.
b) Smears from FNAC procedures should be **fixed immediately**.
c) Please provide at least two air-dried and alcohol-fixed smears.

7.0 SEMEN COLLECTION

To obtain an optimal sperm count, a period of abstinence from sexual activity is required for a minimum of 2 days and a maximum of 7 days before collection of the specimen. 3-5 days of abstinence is recommended.
The best results are obtained when the specimen is collected by masturbation and ejaculated into a wide-mouth sterile plastic container provided
Please ensure your full name, date of birth, date and time of collection are recorded on the container.

NOTE:
Other methods of collection, for example, Coitus interruptus or withdrawal just before ejaculation, are subject to errors. Regular condoms, sheaths and lubricants all interfere with the results of seminal assays and should not be used

The specimen should be kept at room temperature (NOT REFRIGERATED) and must be delivered to Gnosis Laboratory within one hour after collection, between Monday to Friday 8.30am – 5.00pm or Saturdays between 8.30am and 1.00pm.

Transportation:
The sample should be protected from extremes of temperatures (less than 20 degree Celsius and more than 35 degree Celsius.
Place the specimen in a specimen bag and carry on the inside of a pocket or a handbag.
The specimen must be submitted with a signed request form (given by the referring doctor).
NOTE: If a second specimen is required for testing, it must be submitted with a separate request form signed by the referring doctor. The interval between the two collections should not be before seven days and not later than three weeks.

COLLECTION AND SAMPLE INFORMATION (Please complete details in the section below)

Time of Ejaculation: _____ am/pm
Number of days of abstinence: _____
Please indicate if this collection is complete (circle one only) Full / Partial Ejaculate

Patient Information Sheet
Semen Collection

Your sample is examined for the number of sperm present (a sperm count), the ability of the sperm to move (motility), the shape and appearance of the sperm (morphology), the total volume of the ejaculate, and the vitality of the sperm
Follow these instructions carefully to ensure your test results are accurate and reliable

Sample Collection:

- In order to obtain an optimal sperm count, a period of abstinence from sexual activity is required for a minimum of 2 days and a maximum of 7 days before collection of the specimen. 3-5 days abstinence is recommended.
- The best results are obtained when the specimen is collected by masturbation and ejaculated into a wide mouth sterile plastic container provided
- Please ensure your full name, date of birth, date and time of collection are recorded on the container.

NOTE:

Other methods of collection for example – Coitus interruptus or withdrawal just prior to ejaculation, is subject to errors. Regular condoms, sheaths and lubricants all interfere with the results of seminal assays and should not be used
The specimen should be kept at room temperature (NOT REFRIGERATED) and must be delivered to Gnosis Laboratories within one hour after collection between Monday to Friday 8.30am – 5.00pm or Saturdays between 8.30am and 1.00pm.

Transportation:

- The sample should be protected from extremes of temperatures (less than 20 degree Celsius and more than 35 degree Celsius.
- Place the specimen in a specimen bag and carry on the inside of a pocket or a handbag.
- The specimen must be submitted with a signed request form (given by the referring doctor).
  NOTE: If a second specimen is required for testing, it must be submitted with a separate request form signed by the referring doctor. The interval between the two collections should not be before seven days and not later than three weeks.

COLLECTION AND SAMPLE INFORMATION (Please complete details in the section below)

1. Time of Ejaculation: _____ am/pm
2. Number of days of abstinence: _____
3. Please indicate if this collection is complete (circle one only) Full / Partial Ejaculate

8.0 CRITICAL LABORATORY VALUES

Critical laboratory result is test result or value that falls into critical limits or the presence of any unexpected abnormal findings, cells or organisms which may cause imminent danger to the patient, and/or require immediate medical attention.

Notification shall be given to the clinician who had ordered the test or to the authorized personnel if the responsible clinician is not around.

Critical Values for Haematology Test

Test Code	Tests Name	Units	Lower Critical Values	Upper Critical Values
HB	Haemoglobin (Adult) Haemoglobin (Neonate)	g/dL	7.0 g/dl	20.0g/dL
RBC	Red Blood Cell	$x\ 10^6$/L	2.0	8.0
HCT	Hematocrit (Adult) Hematocrit (Neonate)	%	20% 25%	60% 70%
WBC	Total White Blood Cells	$x\ 10^9$/L	2.0	50.0
PLT	Platelet	$x\ 10^9$/L	50	1000
PBF	Blast cells in PBF	%		5 (new cases)
DEN	Dengue IgM and IgG	-	-	Reactive
NS1	Dengue NSI	-	-	Reactive
MALA	Malaria Parasite	-	-	SEEN (any species)

Critical Values for Biochemistry Tests

Code	Name	Units	Low critical value	High Critical value
NA	Sodium	mmol/L	120	160
CL	Chloride (neonates)	mmol/L	70	120
K	Potassium (above 18 years old)	mmol/L	2.5	6.0 *
BIL	Bilirubin (neonatal)	umol/L	-	260
GLU	Fasting Glucose (Adult)	mmol/L	2.6	25.0
MGS	Magnesium	mmol/L	0.4	1.90
UREA	Urea	mmol/L	1.1	28.6
CREA	Creatinine	umol/L	18.0	442
CK	Creatinine Kinase	U/L	-	1000
TROPI	Troponin I	-	-	Positive
CA	Calcium	mmol/L	1.5	3.5
AMY	Amylase	U/L	-	1000
PHOS	Phosphorus	mmol/L	≤ 0.32	-

Critical Values for Special Chemical Pathology Test

Code	Name	Units	Low critical value	High Critical value
FT4	FT4 (Free Thyroxine), <50 yrs	pmol/L	-	≥ 100.4
FT4	FT4 (Free Thyroxine), ≥50 yrs	pmol/L	-	≥ 77.2

* Adopted from Mayo Clinic Laboratories, DLMP Critical Values/Critical Result List

***Note: Based on the clinical note given and remark appropriately in the report if it is a general screening.**

Critical Findings for Microbiology

Test	Results
Cerebrospinal fluid C&S	Microscopic result (N or abN)
Cerebrospinal fluid Ag	Positive rapid Antigen detection
Blood Culture	Positive result Gram stain/culture
Sterile body fluids	Positive result, gram stain/culture
Acid Fast Bacilli	Positive smear result /culture
Malaria Parasite	Presence of a parasite on the blood film
Stool Culture	Salmonella typhi, Vibrio cholerae, Shigella, E. coli O157
Any Type Culture	ESBLs, MRSA, MRO, VRE, VRSA.
Antigen detection	Legionella sp
Pernasal swab	Bordetella Pertussis, Corynebacterium diptheria

Critical Findings for Anatomical Pathology

Test	Results
Unexpected /discrepant findings	Unexpected malignancy, wrong organ removed
Reports of infections	Bacteria in heart valve or bone marrow Organisms in an immune-compromised patients such as AFB, fungi, viral, protozoa Organisms in CSF Unusual organisms or organism in unusual sites
Reports on critically ill patients requiring immediate therapy	Crescents in greater than 50% of glomeruli in renal biopsy specimen Transplants rejections
Cases that have immediate clinical consequences	Fat in an endometrial curettage Mesothelial cells in heart biopsy Fat in snare colon biopsy specimens

9.0 List of tests provided by Gnosis Laboratory Sdn Bhd

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
17OH	**17-Hydroxycorticosteroids (17-OHCS)**	M : 3.00-10.00 mg/day, F : 2.00-8.00 mg/day	Column and Colorimetric	24-hour urine test *In Acid preservative or Refrigeration*	10
17AO	**17-Hydroxyprogesterone (17-OHP)**	M : 0.55-1.99 ng/mL F: Follicular phase : 0.21-1.45 ng/mL Corpus luteum : 0.61-2.88 ng/mL Post Men: 0.16-0.79 ng/mL	RIA	5 ml Plain, *Separate serum & freeze.* *Specify the age, sex, and phase of the cycle. For women, the sample must be taken at the start of the follicular phase.*	10
17KS	**17-Ketosteroids (17-KS)**	M:10.00-25.00 mg/day F:6.00-14.00 mg/day	Column and Colorimetric	24-hour urine collection *In an acid preservative or Refrigeration*	10
5HI	**5-Hydroxyindoleacetic Acid (5-HIAA)**	2.00-8.00 mg/day	**HPLC**	24-hour Urine, *In acid preservative or Refrigeration*	10
ACH	**Acetylcholine Receptor Ab (AchR Ab)**	<0.50 nmol/L	RIA	5 ml Plain, *Separate the serum and freeze*	7 -14
AFBC	**Acid Fast Bacilli (AFB) Concentrated (Membrane-based Smear)**	Not seen	concentrated sandwich smear	Sputum/Pleural Fluid/ FMU/ CSF/ Swab *Significantly higher sensitivity than direct smear.*	2
AFBS	**Acid Fast Bacilli (AFB) ZN Stain (Direct Smear)**	Not seen	bacteriological staining method	Sputum/Pleural Fluid/ FMU/ CSF/ Swab *Collect fresh sputum recommended on three consecutive days or early morning urine or pleural fluid, CSF, or swab.*	2
ACPP	**Acid Phosphatase, Prostatic**	<3.5 ng/mL	CLIA	5 ml Plain	7
ACP	**Acid Phosphatase, Total**	<0.80 IU/L	CLIA	5 ml Plain	5
APTT	**Activated Partial Thrombin Time (APTT)**		Stago coagulation system	2 ml Citrate *If possible, please specify if the patient is on an anticoagulation treatment as well as the clinical context.*	2
ADA	**Adenosine Deaminase (ADA), pleural fluid**	<40 U/L	Enzymatic	Pleural Fluid	10-14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
ADENO	**Adenovirus DNA (by PCR)**	Not Detected	PCR	Discharge/ Aspirate/ Swab	7
ACTH	**Adrenocorticotropic Hormone (ACTH)**	7.2 – 63.3pg/ml	CLIA	3 ml EDTA (Plasma) *Not to be performed on a haemolysed sample. Sample on a cooled tube at 4°C, centrifuge a.s.a.p and freeze the plasma.*	7
ALT	**Alanine Aminotransferase (ALT/SGPT)**	M: <50 U/L F: <35 U/L	UV/NADH	5 ml Plain	1
ALB	**Albumin**	32 – 52 g/l	BCG method	5 ml Plain	1
FALD	**Aldosterone, Urine**	2.84-33.99 µg/day;	RIA)	24hr Urine, *In acid preservative or Refrigeration*	7
ALD	**Aldosterone, Serum**	Vertical: 48.30-270.00 pg/ml; Recumbent: 68.00-173.00pg/ml	CLIA	5 ml Plain *Do not refer to haemolysed or lipaemic samples.* *Specify upright or reclined (Sampling in upright position after 1 hr walking; sampling in reclined position after 1 hr in supine position).*	7
ALKP	**Alkaline Phosphatase (ALP)**	M: 43 - 115 F: 33- 98 U/L	p-Nitro-phenylphosphate	5 ml Plain	1
ALPB	**Alkaline Phosphatase - Bone (BAP)**	5.1 - 20.2 ug/L	CLIA	5 ml Plain, *Separate serum and freeze*	5-7
ALPE	**Alkaline Phosphatase Isoenzymes Electrophoresis** - Liver, Bone, Intestine, Fast Liver	Alkaline-P 34-104 U/L FAST LIVER 0.0-0.0 U/L LIVER 11.4-76.9 U/L BONE 8.0-61.4 U/L INTESTINE 0.0-16.8 U/L	Electhrophoresis	5 ml Plain	7-14
	Allergy Tests (refer to Allergy Section in Profile Tests)				
A1A	**Alpha-1 Antitrypsin**	90 -200 mg/g	Nephelometry	5 ml Plain	7
A1AS	**Alpha-1 Antitrypsin, Stool**	0-2.957 mg/g of dry stool	Radial Immunodiffusion	Fresh Stool	15
AFP	**Alpha-Fetoprotein (AFP)**	<9.0 ng/ml	CLIA	5 ml Plain	2
AMMO	**Ammonia**	18-72umol/L	Enzymatic Glutamate Dehydrogenase	3 ml EDTA (Plasma)	7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
AMOE	**Amoebic Antibody (*E histolytica*)**	＜9 (-)；9~11(+/-)；＞11(+)NTU	ELISA	5 ml Plain	7
AMY	**Amylase**	28 – 100 U/L	CNPG3	5 ml Plain	2
UAM	**Amylase (Diastase), Urine**	<450 U/L	CNPG3	20 ml Urine	7
ASD	**Androstenedione (ASD)**	M: 0.64 – 2.97 F: 0.35 – 2.78 Pos Men: 0.30 – 2.07	RIA (Radioimmunoassay)	5 ml Plain, *Separate serum and freeze*	15
	Antibody Screen (refer to Coombs' Test, Indirect)				
ABMZ	**Anti-Basement Membrane Zone Abs (Anti-BMZ)**	<1:20X(-)	IFA	5 ml Plain	15
ABGPG	**Anti Beta-2 Glycoprotein-I IgG**	≦20.0 CU(-), >20.0 CU(+)	CLIA	5 ml Plain	7-10
ABGPM	**Anti Beta-2 Glycoprotein-I IgM**	≦20.0 CU(-), >20.0 CU(+)	CLIA	5 ml Plain	7-10
ACAG	**Anti-Cardiolipin IgG (ACA IgG)** (a type of Antiphospholipid Ab)	≦20.0 CU(-)；＞20.0 CU(+)	CLIA	5 ml Plain	8
ACAM	**Anti-Cardiolipin IgM (ACA IgM)** (a type of Antiphospholipid Ab)	≦20.0 CU(-)；＞20.0 CU(+)	CLIA	5 ml Plain	8
ACCP	**Anti-Cyclic Citrullinated Peptide Ab (Anti-CCP)**	Neg: <35, Pos: >35 U/ml	Immunoturbidimetric	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	5
ADNA	**Anti-double-stranded DNA (Anti-dsDNA)**	<100 IU/mL	IFA	5 ml Plain	7
ENAT	**Anti-Extractable Nuclear Antigen (Anti-ENA), Total (Qualitative)**	<0.7(-)	FLISA	5 ml Plain	7
ENA	**Anti-ENA Identification (6 types):** RNP Ab, Sm Ab,	Neg:<100, Eq:100-120, Pos:>120	SAT (Signal Amplification Technique)	5 ml Plain	7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
	SS-5 ml Plain A Ab, SS-B Ab, Scl-70 Ab, & Jo-1 Ab				
GPCA	**Anti-Gastric Parietal Cell Abs (APCA)**	<1:10X(-)	IFA	5 ml Plain	7-14
GBM	**Anti-Glomerular Basement Membrane Abs (AntiGBM)**	<1:10X(-)	IFA	5 ml Plain	7-14
INTAB	**Anti-Intercellular Substance Abs**	<1:20X(-)	IFA	5 ml Plain	7-14
ALKM	**Anti-Liver Kidney Microsomal 1 Ab (Anti-LKM1)**	<1:10X(-)	IFA	5 ml Plain	12
	Anti-Microsomal Ab (AMA) (see Anti-TPO)				
AMIA	**Anti-Mitochondrial Ab**	<1:10X(-)	IFA	5 ml Plain	12
AMH	**Anti-Mullerian Hormone (AMH)**	Ovarian Reserve: Very low <1.5pmol/L Low:<1.5-6.5 pmol/L Normal: 6.5-9.8pmol/L Good: > 19.8 pmol/L Ovarian Stimulation Response: Poor Response: <14.3pmol/L High/Excessive: >22.8pmol/L PCOS SUSPECTED >52pmol/L	CLIA	5 ml Plain	5-7
ANCA	**Anti-Neutrophil Cytoplasmic Ab (ANCA) with pattern (by IFA method)**	Negative	IFA	5 ml Plain	12
ANA	**Anti-Nuclear Abs (ANA) with pattern (by IFA)**	Negative(<1:80)	IFA	5 ml Plain	5
APSG	**Anti-Phosphatidylserine IgG**	＜12(-)	ELISA	5 ml Plain	7-10
APLA	**Anti-Platelet Antibody**	Negative		5 ml Plain	7-10

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
ASMA	**Anti-Smooth Muscle Ab (ASMA)**	<1:10X(-)	IFA	5 ml Plain	12
ASA	**Anti-Sperm Ab, Circulating**	<150 mU/100µL	ELISA	5 ml Plain	7-10
ASOT	**Anti-Streptolysin O Titre (ASOT), Spot test**	Non-Reactive	latex agglutination	5 ml Plain	2
AT3	**Anti-Thrombin III**	83~128 %	Colorimetric method	2x 2 ml Citrate *Always specify the treatment and clinical context of the test prescription: Unfractionated heparin may induce a weak decrease in antitrombin level.*	15-20
ATAB	**Anti-Thyroglobulin Ab (ATA)**	<4 IU/mL	2 steps EIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	5
ATPO	**Anti-Thyroid Peroxidase (Anti-TPO)**	<9 IU/mL	2 steps EIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	5
APOA	**Apolipoprotein A1 (Apo-A1)**	M: 1.05-1.75g/L F: 1.05-2.05g/L	Immunoturbidimetric	5 ml Plain	3
APOB	**Apolipoprotein B (Apo-B)**	M: 0.60-1.40g/L F: 0.55-1.30g/L	Immunoturbidimetric	5 ml Plain	3
APOP	**Apo- A1, Apo-B & Ratio**	M: Risk: Average 0.7 - 0.9, High > 0.9 F: Risk: Average 0.6 - 0.8, High > 0.8	Calculation	5 ml Plain *Fasting sample.*	3
APOEG	**Apolipoprotein E genotyping (by PCR)**	Not Detected	PCR	5 ml Plain	7-14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
AST	**Aspartate Aminotransferase (AST/SGOT)**	M: <50U/L F:<35U/L	P5P with UV	5 ml Plain	1
BJP	**Bence-Jones Protein (by heat test)** (consider Immunofixation Ep)	Negative	Thermal Turbidity	20 ml FMU, *Refrigeration, without preservatives and acid*	5
B2GG	**Beta-2 Glycoprotein 1 IgG**	≦20.0 CU(-), >20.0 CU(+)	CLIA	5 ml Plain	7
B2GM	**Beta-2 Glycoprotein 1 IgM**	≦20.0 CU(-), >20.0 CU(+)	CLIA	5 ml Plain	10
B2M	**Beta-2 Microglobulin, Serum**	0.97-1.84 mg/L	Immunoturbidimetric	5 ml Plain, *Always indicated the beginning or end of dialysis*	5
UB2M	**Beta-2-Microglobulin, Urine**	< 320ug/mL	Immunoturbidimetric	20 ml FMU	5
HCG	**Beta-Human Chorionic Gonadotropin, Total (β-hCG)**	Males: 0.1 - 1.0 IU/L Non-pregnant Females (= 18 and < 40 years): 0-0.6 IU/L Post-menopausal: 0.1 – 11.6 IU/L	CLIA	5 ml Plain	2
HCGF	**β-hCG, Free**	< 0.16 ng/mL	Kinetic Chemiluminescence	5 ml Pain	7
BID	**Bilirubin, Direct/Conjugated ***	<3.4 umol/L	DCP-TFB	5 ml Plain, *Wrap or Store away from light.*	1
BIT	**Bilirubin, Total ***	5-21 umol/L	DCP-TFB	5 ml Plain, *Wrap or Store away from light.*	1
	Blood Culture & Sensitivity (refer to Culture)				
	Blood Film Comment (refer to Full Blood Picture)				
ABORH	**Blood Grouping & Rhesus (ABO & Rh)**	-	Imunohaematology assay microplate & Tube method	3 ml EDTA	1
BRCA	**BRCA 1 & 2 Gene Mutation Analysis** Genetic risk marker for breast & ovarian cancer	Next Generation Sequencing	(Pathogenic/Likely pathogenic mutation)	2x 3 ml EDTA *Attach the current clinical and therapeutic data*	14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
BNPF	**B-type Natriuretic Peptide (NT pro-BNP)**	<300 pg/ml	FIA	3 ml EDTA (Plasma)	5
125	**CA 125** (Ovarian cancer)	< 35 U/ml	CLIA	5 ml Plain	2
153	**CA 15-3** (Breast cancer)	<23.5 U/ml	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	2
199	**CA 19-9** (Pancreatic, gastric cancer)	<35 U/ml	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	5
724	**CA 72-4 (TAG-72**) (Gastrointestinal, Breast cancer)	<10.0 U/ml	CLIA	5 ml Plain *Collect the sample away from a meal to avoid hypergastrinemia. In case of proton pump treatment, recommended to collect the sample afstopsake. Or please collect the sample 2 weeks after treatment stopped. Separate serum & freeze.*	6-8
CAC	**Calcitonin**	M: <18.2 pg/ml F: <11.5 pg/ml	CLIA		
CA	**Calcium**	2.20-2.65 mmol/L	Arsenazo IIII	5 ml Plain	1
CAF	**Calcium, Free (Ionised)**			5 ml Heparin (whole blood)	7-14
UCA	**Calcium, Urine**	100-300mg/24hrs	Arsenazo	24 hr Urine, *in an Acid preservative and Refrigeration*	5
CAD	***Candida albicans* DNA (by PCR)**	Not Detected	PCR	Genital Swab / FVU	7
CEA	**Carcino-Embryonic Antigen (CEA)**	<5.0ng/ml (Non-Smoker) <10.0 ng/ml (Smoker)	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin*	2

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
				B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.	
	Carcinoid Syndrome (refer to 5-HIAA)				
	Carnitine, Free & Total			5 ml Plain	14-20
CD48	**CD4 / CD8 Count**	Pan T Cells H (51 – 80%) (928 - 2 379 cell/uL) CD8+ T cells H (16 - 36) (307-925) CD4+ T cells (28 – 48%) (497 - 1 465 Cell/ul) CD4/CD8 ratio (0.90- 2.50)		3 ml EDTA ***Call Lab***	5
CER	**Ceruloplasmin**	200.0-600.0 mg/L	Immunoturbidimetric	5 ml Plain	5
CHIM	**Chikungunya IgM**	Non-Reactive	RTK	5 ml Plain	2
CLPM	***Chlamydia pneumoniae* IgM**	＜1.4(-) ; 1.4-1.5(+/-) ; ＞ 1.5(+)	ELISA	5 ml Plain	7-10
	***Chlamydia* Ag** (refer to Chlamydia DNA PCR)				
CLA	***Chlamydia trachomatis* IgA**	<5 (-); ≥5 - < 6(+/-); ≥ 6(+)	CLIA	5 ml Plain	5
CLG	***Chlamydia trachomatis* IgG**	(-):<0.8, (+):>1.1	ELISA	5 ml Plain	5
CLM	***Chlamydia trachomatis* IgM**	(-):<0.8, (+):>1.1	ELISA	5 ml Plain	5
CTNG	***Chlamydia trachomatis* & *Neisseria gonorrhoeae* DNA (by PCR)**	Not Detected	PCR	Genital Swab / FVU	5
CHO	**Cholesterol, Total**	Desirable: < 5.2 mmol/L Borderline High: 5.2 – 6.1 mmol/L High: ≥ 6.2 mmol/L	CHO-POD	5 ml Plain	2
CGA	**Chromogranin A (CgA)**	< 101.9 ng/ mL	Automated Immunofluorescent Assay	5 ml Plain *Centrifuge without delay, separate the supernatant and freeze.*	7-10

<table>
<tr><th>Code</th><th>Name of Test</th><th>Reference range</th><th>Methodology</th><th>Type of Specimen</th><th>TAT (Days)</th></tr>
<tr><td></td><td></td><td></td><td></td><td>PPIs should be stopped 2-3 weeks before the test.</td><td></td></tr>
<tr><td>DDI</td><td>D-Dimer (Quantitative) (may also consider FDP</td><td><0.5 mg/L</td><td>FIA</td><td>2 ml Citrate</td><td>5</td></tr>
<tr><td>DHEAS</td><td>Dehydroepiandrosterone Sulfate (DHEA-S)</td><td>Reference Values for DHEA-S (ug/dL) (CLIA method)
<table><tr><th></th><th>Male</th><th>Female</th></tr><tr><th>Age</th><th>Range</th><th>Range</th></tr><tr><td>16 – 20</td><td>24 – 357</td><td>51 – 321</td></tr><tr><td>21 – 30</td><td>85 – 690</td><td>18 – 391</td></tr><tr><td>31 – 40</td><td>106 – 464</td><td>23 – 286</td></tr><tr><td>41 – 50</td><td>70 – 495</td><td>19 – 231</td></tr><tr><td>51 – 60</td><td>38 – 313</td><td>8 – 188</td></tr><tr><td>61 – 70</td><td>24 – 244</td><td>12 – 133</td></tr><tr><td>71 – 85</td><td>5 – 253</td><td>7 – 177</td></tr></table></td><td>CLIA</td><td>5 ml Plain
Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin.
Essential to stop treatment 8 days before taking the sample.</td><td>7</td></tr>
<tr><td>DENGM</td><td>Dengue Serology (IgG & IgM), Rapid Test</td><td>Non-Reactive</td><td>RTK</td><td>5 ml Plain</td><td>1</td></tr>
<tr><td>DENAG</td><td>Dengue NS1 Antigen (intended for 1st -5th days)</td><td>Non-Reactive</td><td>RTK</td><td>5ml plain</td><td>1</td></tr>
<tr><td>DHT</td><td>Dihydrotestosterone (DHT)</td><td>Male (pg/mL)
(1-9) <17.0-85.7
(10-14) <17.0-875.6
(15-18) 70.3-1260.9
(20-89) 143.0-842.0
Female (pg/mL)
(2-9) <17.0-88.9
(10-14) 22.5-280.6
(15-18) 62.6-760.3
(18-50) <17.0-596.0
(51-83) <17.0-431.0</td><td>ELISA</td><td>5 ml Plain
Separate serum & freeze.</td><td>7-10</td></tr>
<tr><td>DNAF</td><td>DNA Profiling for Paternity (for non-legal proceedings only)</td><td>Referral</td><td></td><td>3 ml EDTA
Specimen each from child, mother & alleged father. Use Specific Form</td><td>14</td></tr>
<tr><td>DNA1</td><td>~ Add each additional child</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Down Syndrome Screen (refer to Foetal Screen in Profile Test)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>ELT</td><td>Electrolytes (Na, K & Cl), Serum</td><td>Na: 136-146 mmol/L
K:3.5-5.1 mmol/L
CL: 101-109mmol/L</td><td>Electrical Potential</td><td>5 ml Plain</td><td>1</td></tr>
</table>

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
UELT	**Electrolytes (Na, K & Cl), Urine**	Na: 40-220mEq/24hrs K: 25-125mEq/24hrs CL: 110-250 mEq/24hrs	Electrical Potential	24 hr Urine, *in Refrigeration without acid preservative*	1
ELAL	**Endotoxin, LAL Assay**	<0.25 EU/mL	Gel method	Water/ Dialysate	7
ECP	**Eosinophil Cationic Protein (ECP)**	<15.0 ug/L	Fluoro Enzyme Immunoassay	5 ml Plain	5
EBVD	**Epstein-Barr virus (EBV) DNA Detection**	Not Detected	PCR	Serum/ Swab/ Fluid	7
EBA	**EBV EA+NA1 IgA** (for NPC)	<4.5 EU/mL (+)	ELISA	5 ml Pain	5
EBEG	**EBV Early Ag (EA) IgG** (for IM/NPC)	<100 AU/mL	SAT METHOD	5 ml Plain	5
EBVA	**EBV Viral Capsid Ag (VCA) IgA** (for NPC)	Non-Reactive:<2.0, Weak React:2-10, Reactive:>10	ELISA	5 ml Plain	3
EBVG	**EBV Viral Capsid Ag (VCA) IgG** (for IM)	≦0.90(-) ; 0.91-1.09 (±) ; ≧1.1(+)	CLEIA	5 ml Plain	8
EBVM	**EBV Viral Capsid Ag (VCA) IgM** (for IM)	≦0.90(-) ; 0.91-1.09 (±) ; ≧1.1(+)	CLEIA	5 ml Plain	8
ESR	**Erythrocyte Sedimentation Rate (ESR)**	M:0-15 mm/hour F:0-20 mm/hour	Westergren manual method	3 ml EDTA	1
EPO	**Erythropoietin (EPO)**	4.3-29.0 mIU/mL	CLIA	5 ml Plain, *Sample in morning (variations during day). Separate serum & freeze.*	7
E2	**Estradiol (E2)** (Ovarian Function)	pmol/L (Unit) Males: < 55.1 - 115.6 Early Follicular: 82.23 - 422.2 Mid-follicular phase: 91.8 - 422.2 Ovulatory Peak: 117.8 - 1897.9 Mid-luteal phase: 134 - 903.1 Post-menopausal (Not on Hormone Therapy): < 55.1 - 92.1	CLIA	5 ml Plain	3
E3U	**Estriol, Free (uE3)** (Pregnancy Monitoring)	0.017-0.066 ng/mL (Non-Pregnant)	CLIA	5 ml Plain	7
FOB	**Faecal Occult Blood** *(human-Hb specific)*	Non-Reactive	RTk	Fresh Stool	2

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
FFEM	**Faeces FEME-** *for Amoeba/Ova/Cyst*	No pus cells and No RBC seen. No Amoeba, Cyst or Ova seen.	-	Fresh Stool	2
FER	**Ferritin**	Male: 23.9 - 336.2 pg/ml Female: 11.0 - 306.8 pg/ml	CLIA	5 ml Plain	5
FHB	**Foetal Haemoglobin (APT Test)**			Stool/ Vomitus	5
	Foetal Abnormalities Risk Screening 1st & 2nd Trimester (refer to Profile Test Page 18)				
FDP	**Fibrin Degradation Products (FDP)** (may also consider D-Dimer)	<20 ug/ml	Immunoturbidimetry	2x 2 ml Citrate	5
FIB	**Fibrinogen**	2.00-3.93 mg/dL	coagulation	2x 2 ml Citrate	
FOLR	**Folic Acid (Folate), RBC**			3 ml EDTA, *wrap and avoid light*	Research, Call
FOL	**Folic Acid (Folate), Serum**	>5.9 ng/ml	CLIA	5 ml Plain, *Fasting sample.*	5
FSH	**Follicle Stimulating Hormone (FSH)**	**mIU/mL** Males: 1.27-19.26 Mid-Follicular Phase: 3.85-8.78 Mid-Cycle Peak: 4.54- 22.51 Mid-Luteal Phase: 1.79-5.12 Post-Menopausal: 16.74-113.59	CLIA	5 ml Plain	3
FXSG	**Fragile X Syndrome (FXS) Genetic Assay**	-	PCR	3 ml EDTA	20
FRUC	**Fructosamine**	<285 umol/L		5 ml Plain	Research, Call
FUNG	**Fungus Microscopic**	Not Seen		Skin Scraps	2
G6PD	**G6PD Screening**	Normal	rapid fluorescent spot test	Blotted blood on paper or 3 ml EDTA	2
G6PQ	**G6PD, Quantitative**	7.9-16.3 U/g Hb	NADPH	3 ml EDTA	3-5
GGT	**gamma-Glutamyl Transferase (GGT)**	M: <55 U/L F: < 38 U/L	Gamma glutamyltraferase	5 ml Plain	1

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
GAS	**Gastrin**	13-115 pg/ml	CLIA	5 ml Plain, *Fasting minimum 10 – 12 hours. After removing the coagulated mass, quickly centrifuge the sample to separate the serum & freeze.*	7
GLU	**Glucose, Fasting**	Normal: 7.0 mmol/L Impaired: 6.1-6.9 Diabetes: >7.0	Hexokinase	2 ml Fluoride, *Fasting*	1
GLU2	**Glucose, 2 hrs Post-Glucose Load**	mmol/L Normal: 4.0 - 7.8, Impaired: 7.9 - 11.0, Diabetic: >11.0	Hexokinase	2x 2 ml Fluoride, *Fasting & 2 hours Post-Glucose*	1
GAD	**Glutamic Acid Decarboxylase AutoAbs (GAD AutoAbs)**	<5 U/mL	ELISA	5 ml Plain	15-20
GALB	Glycated Albumin (GA) (diabetic monitoring)	11 - 16 %	Enyzmatic	5 ml Plain	3 -5
GRAM	Gram's Stain Examination	Not Seen	-	Swab / Smear / Urine	1
HGH	Growth Hormone (hGH)	<5 ng/ml	RIA	5 ml Plain, Separate serum & freeze. Note time of collection & fasting / stimulation / suppression	7
A1C	Haemoglobin A1c (HbA1c)	Normal: <5.6, Pre-diabetes: 5.6-6.2, Diabetes: >6.3, Control Target: <6.5 (%)	Turbidimetric immunoinhibition	3 ml EDTA	1
HAPG	Haptoglobulin	44-215 mg/dl	Immunoturbidimetric	5 ml Plain	5
HDLC	HDL-Cholesterol (Direct Method)	>1.03mmol/L	Accelerator Selective Detergent	5 ml Plain	1
HPYG	H. pylori IgG (semi-quantitative)	Non-Reactive: <1.000, Reactive:>= 1.000	CLIA	5 ml Plain	2
HPYA	H. pylori Abs (with Current Infection Marker)	Non-Reactive	colloidal gold	5 ml Plain	2
UBT4	H. pylori 14C-Urea Breath Test	Negative	Urea Breath	Breath in card Resting patient, fasting for a minimum of 6 hours (no drink, no food, no smoke). No antibiotic treatment for 4 weeks. No	3

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
				Proton-pump inhibitor treatment for 2 weeks. No antacids and gastro-intestinal protectants 24 hours before the test.	
HAV	Hepatitis A IgG (Anti-HAV)	Reactive: Immunity	CLIA	5 ml Plain	1
AVM	Hepatitis A IgM (HAV IgM)	Reactive (>1.0)	ECLIA	5 ml Plain	5
BCG	Hepatitis B core Abs (Anti-HBc)	Negative: >1.0	ECLIA	5 ml Plain	5
BCM	Hepatitis B core IgM (HBc IgM)	Reactive (>1.0)	ECLIA	5 ml Plain	5
BCAG	Hepatitis B core-related Antigen (HBcr Ag), Quantitative	<3 LogU/mL	CLEIA	5 ml Plain	7-10
EAB	Hepatitis B envelope Ab (Anti-HBe)	Reactive	CLIA	5 ml Plain	3
EAG	Hepatitis B envelope Ag (Hbe-Ag)	Non-Reactive	CLIA	5 ml Plain	3
SAB	Hepatitis B surface Ab (Anti-HBs)	Non-Reactive:<10mIU/ml, Strong immunity:>100mIU/ml	CLIA	5 ml Plain	1
SAG	Hepatitis B surface Ag (HBs-Ag)	Non-Reactive	CLIA	5 ml Plain	1
SAGQ	Hepatitis B surface Ag, Quantitative	<0.05IU/mL	CLIA	5 ml Plain	5
HBVPC	HBV Pre-core (PreC) Mutant	Non-mutate	Real-time PCR	5 ml EDTA (Plasma), Separate plasma & freeze	7-14
HBVPS	HBV Pre-surface (PreS) Mutant	Non-mutate	Real-time PCR	5 ml EDTA (Plasma), Separate plasma & freeze	7-14
HBVY	HBV Drug Resistance Analysis	Non-mutate	DNA analysis	5 ml EDTA (Plasma), Separate plasma & freeze. Please specify the date and result of the last viral load. The minimum viral load is 100 IU.	7-14
HBVG	HBV-DNA Genotyping	Undetected	PCR	5 ml EDTA (Plasma), Separate plasma & freeze. Please specify the date and result of the last viral load. The minimum viral load is 100 IU.	7-14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
HBVL	HBV-DNA Viral load (by qPCR)	Not Detected	Real-time PCR	5 ml EDTA (Plasma), Separate plasma & refrigerate	7-10
HCV	Hepatitis C Ab (Anti-HCV)	Non-Reactive	CLIA	5 ml Plain	2
HCVG	HCV-RNA Genotyping	Undetected	Real time PCR	5 ml EDTA (Plasma), Separate plasma & freeze. Please specify the date and result of the last viral load. The minimum viral load is 500 IU.	7-14
HCVR	HCV-RNA Viral load (qPCR)	<10 IU/ml (Not Detected)	Real-time PCR	3 ml EDTA (Plasma), Separate plasma & refrigerate	7-10
H1G	Herpes Simplex Virus (HSV) Type 1 IgG	Equiv: 0.8-1.2, Reactive: >1.2	ELISA	5 ml Plain	5
H2G	HSV Type 2 IgG	Equiv: 0.8-1.2, Reactive: >1.2	ELISA	5 ml Plain	5
H12M	HSV Type 1 & 2 IgM	<0.9 (-) index, ≧0.9 to <1.1 (equivocal) index, ≧1.1 (+) index	ELISA	5 ml Plain	5
HSVD	HSV DNA type 1 & 2 DNA	Not Detected	PCR	Swab/ Urine/ CSF/ Serum	7-14
HCY	Homocysteine, total (tHcy)	5.0-15.0 umol/L	Enzymatic assay	3 ml Plain, Fasting, refrigerated, separate serum a.s.a.p	3
HVA	Homovanillic Acid (HVA)	3.00 - 8.00 mg/day	HPLC	24 hr Urine, in Acid preservative and Refrigeration	5-7
HIV	Human Immunodeficiency Virus (HIV) 1&2 Ab+Ag Screen (HIV 1&2 Ab+p24 Ag)	Non-Reactive	CLIA	5 ml Plain Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.	2
HIVCT	HIV 1 & 2 Confirmation Test (ICA) - identify both type 1 & 2	Negative	Immunochromatographic (ICT)	5 ml Plain	7
HIVL	HIV-RNA Viral load (RT-PCR)	< 20.0 Copies/mL	Real time PCR	2x 3 ml EDTA (Plasma), Separate plasma & refrigerate	7
HLA12	Human Leukocyte Ag (HLA) Typing (by NGS) Total 12 loci – HLA-A, B, C, DRB1, DQB1, DPB1, DPA1, DQA1, DRB3/4/5 & G	-	PCR	3 ml EDTA	20-30

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
HLAA	HLA Typing – HLA-A	-	PCR	3 ml EDTA	14-18
HLAB	HLA Typing – HLA-B	-	PCR	3 ml EDTA	14-18
HLAC	HLA Typing – HLA-C	-	PCR	3 ml EDTA	14-18
HLARB	HLA Typing – HLA-DRB1	-	PCR	3 ml EDTA	14-18
HLAQB	HLA Typing – HLA-DQB1	-	PCR	3 ml EDTA	14-18
HLAPB	HLA Typing – HLA-DPB1	-	PCR	3 ml EDTA	14-18
B27	Human Leukocyte Ag (HLA) -B27 Genes	Negative	PCR	3 ml EDTA	14-18
B1502	Human Leukocyte Ag (HLA) -B1502 Genes	Negative	PCR	3 ml EDTA	14-18
B5801	Human Leukocyte Ag (HLA) -B5801 Genes	Negative	PCR	3 ml EDTA	14-18
HPVD	Human Papilloma Virus (HPV) DNA Genotyping - detect & report 32 major high & low risk genotypes	Not detected	PCR	Cervical Brush in collection kit	7
HPVS	Human Papilloma Virus (HPV) DNA Screen – detect 16, 18 and 13 other high-risk genotypes	Not detected	PCR	Cervical Brush in collection kit	7-10
HDGA	Huntington's Disease Genetic Assay	Normal	PCR	3 ml EDTA	7-14
IFE	Immunofixation Electrophoresis (IFE), Serum	No paraprotein	Electrophoresis	5 ml Plain	14
IFEU	Immunofixation Electrophoresis (IFE), Urine/CSF	No paraprotein	Electrophoresis	50 ml FMU or 24hr Urine/10 ml CSF	14
IGA	Immunoglobulin A (IgA)	66-433 mg/dL	Immunoturbidimetric	5 ml Plain	5
IGD	Immunoglobulin D (IgD)	<100 IU/mL	SRID	5 ml Plain	8
IGE	Immunoglobulin E (IgE), Total	＜100 kU/L	CLIA	5 ml Plain	5
IGEC	Immunoglobulin E (IgE), Low Range (for Newborn)		CLIA	3 ml EDTA Cord Blood (Plasma)	5
IGG	Immunoglobulin G (IgG)	635-1741 mg/dL	Immunoturbidimetric	5 ml Plain	5

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
IGGS	Immunoglobulin G Subclass 1 - 4		Nephelometry	5 ml Plain	10
IGM	Immunoglobulin M (IgM)	45-281 mg/dL	Immunoturbidimetric	5 ml Plain	5
INAB	Influenza Virus type A & B Antigen - Rapid	Negative	RTK	Nasopharyngeal Swab	1
INHA	Inhibin A	-	CLIA	5 ml Plain	7
INS	Insulin	1.9-23.0uIU/ml	CLIA	5 ml Plain, *Fasting sample. Separate serum & freeze.* *For HOMA index calculation, confirm the fasting blood sugar* *level performed on the same day as the sample collection for insulin.* *Interference possible in patients treated with biotin (vitamin* *B7, B8 or H) or taking any food supplement containing biotin.* *Essential to stop treatment 8 days before taking the sample*	5
IGF1	Insulin-like Growth Factor-1 (IGF-1), Total (Somatomedin-C)	Age Range Reference Interval (ng/mL) 14 220 – 972 15 235 – 988 16 226 – 938 17 193 – 754 18 163 – 579 19 143 – 486 20 128 – 464 21-25 138 – 363 26-30 116 – 334 31-35 115 – 320 36-40 111 – 284 41-45 101 – 270 46-50 94 – 266 51-55 87 – 234 56-60 85 – 230	CLIA	5 ml Plain (fasting), Separate serum & freeze.	7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
		61-65 75 – 223 66-70 69 – 211 71-75 64 – 188 76-80 59 – 181 81-85 49 – 161			
SI	Iron, Serum	M:12.5-32.2umol/L F:10.7-32.2umol/L	TPTZ	5 ml Plain, Fasting sample.	1
IA2	Islet Antigen-2 (IA2) Antibodies	<7.5 u/mL	ELISA	5 ml Plain, Separate serum & freeze.	30
LCA	Lactate (Lactic Acid), plasma	0.5-2.2 mmol/L	Enzymatic	3 ml Fluoride, fasting, avoid tourniquet	5
LDH	Lactate Dehydrogenase (LDH)	<248U/L	Lactate-Pyruvate (NAD)	5 ml Plain	1
LDHE	LDH Isoenzyme Electrophoresis	LDH 1 30.0-90.0 IU/L LDH 2 35.0-100 IU/L LDH 3 20.0-70.0 IU/L LDH 4 0.0-20.0 IU/L LDH 5 0.0-25.0 IU/L LDH total (EP) 100-225 IU/L	Electrophoresis	5 ml Plain	5
LDL1	LDL-Cholesterol (Direct Method)	<2.60 mmol/L	CHO-POD	5 ml Plain	1
LEG	Legionella Antibodies	<1:128X (-)	IFA	5 ml Plain	7-10
LEGUG	Legionella Urinary Antigen	Negative	Immunochromatographic (ICT)	20 ml Urine	5
	Leptin			5 ml Plain	Research, call
LPSM	Leptospira IgM	Non-Reactive	RTK	5 ml Plain	3
LIPA	Lipase	11-82 U/L	Enzymatic, Colorimetric	5 ml Plain	5
LPA	Lipoprotein (a), Lp(a)	< 34 mg/dL	Latex immunoturbidimetric	5 ml Plain	5
LEP	Lipoprotein Electrophoresis	ALPHA 80-310 mg% PRE-BETA 50-180 mg% BETA 160-400 mg% CHYLOMICRON 0-50 mg% Total Lipid 400-800 mg%	Electrophoresis	5 ml Plain	5

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
LUPA	Lupus Anticoagulant (by PTT-LA & dRVVT)	Negative	STACLOT_LA	2x 2* ml Citrate *as specified on tube, Stop heparin therapy one day before test. (freeze Plasma)	5-7
LH	Luteinising Hormone (LH)	mIU/ml Males: 1.24-8.62 Mid-Follicular Phase: 2.12-10.89 Mid-Cycle Peak: 19.18-103.03 Mid-Luteal Phase: 1.20-12.86 Post Menopausal: 10.87-58.64	CLIA	5 ml Plain	3
MGS	Magnesium, Serum	M: 0.73-1.06 mmol/L F: 0.77-1.03 mmol/L	Xylidyl Blue	5 ml Plain	2
MALA	Malaria Parasite	Not Seen	Direct smear	3 ml EDTA	2
MEAG	Measles IgG	<200(-); ≧200- <275(+/-); ≧275(+) IU/L	ELISA	5 ml Plain	7
MEAM	Measles IgM	<0.8(-); ≧0.8-<1.1(+/-); ≧1.1(+)	ELISA	5 ml Plain	7
MTHFR	Methylenetetrahydrofolate reductase (MTHFR) Genetic Assay	-	PCR	3 ml EDTA	7-14
MFP	Microfilaria Parasite	Not seen	Direct smear	3 ml EDTA	2
MON	Monospot (Infectious Mononucleosis) (may also consider EBV)	Non-Reactive		5 ml Plain	1
MUMG	Mumps IgG	<16(-); ≧16- <22(+/-); ≧22(+) RU/mL	ELISA	5 ml Plain	8
MUMM	Mumps IgM	<0.8(-); ≧0.8-<1.1(+/-); ≧1.1(+)	ELISA	5 ml Plain	8
MTD	Mycobecterium tuberculosis (MTB) DNA (by PCR) Detect MTB & differentiate with other Mycobacteria spp	Not Detected	PCR	Sputum/ Bronchial Wash/ Fresh Tissue/ CSF	5-7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
TBIGRA	TB- Interferon Gamma Release Assay (TB-IGRA) (QuantiFERON)	Negative	QuantiFeron	5 ml Heparin Blood, reach lab within 2hrs In room temperation, Call Lab	7
MGEND	Mycoplasma genitalium DNA Detection	Not Detected	PCR	Plain Swab	7
MHOMD	Mycoplasma hominis DNA Detection	Not Detected	PCR	Plain Swab	7
MPG	Mycoplasma pneumoniae IgG	1:40X(-)	Particles Agglutination ; PA	5 ml Plain	5
MPM	Mycoplasma pneumoniae IgM	＜770 U/mL (-) ; 770-950 U/mL Equivocal ; ＞950 U/mL (+)	ELISA	5 ml Plain	7
MYG	Myoglobin, serum	M : 17.4-105.7 ng/mL ; F : 14.3-65.8 ng/mL	Chemiluminescence	5 ml Plain	5
MYGU	Myoglobin, urine	<11.5 ng/mL	Chemiluminescence	20ML Urine bottle	5
NSE	Neuron-Specific Enolase (NSE)	<20.0 ng/ml	CLIA	5 ml Plain. Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.	5
OSS	**Osmolality,Serum**	275-295 mOsm/kg H2O	Freezing point depression method	5ml , Plain	5
OSU	**Osmolality, Urine**	50-1200 mOsm/kg H2O	Freezing point depression method	20 ml Urine	5
OTC	**Osteocalcin**	<table><tr><td></td><td>Male</td><td>Female</td></tr><tr><td>18-<30</td><td>24.00-70.00</td><td>11.00-43.00</td></tr><tr><td>30-50</td><td>14.00-42.00</td><td>15.00-46.00</td></tr><tr><td>>50-70</td><td>14.00-46.00</td><td>13.00-48.00</td></tr></table>	ECLIA	3 ml EDTA (Plasma) fasting, morning	7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
PAP	**PAP Smear**	Bethesda report format	Pap Stain	Fixed smear	4-6
PALP	**PAP Test, Liquid based preparation**	Bethesda report format	Pap Stain	Cervical brush in Collection kit	4-6
PTHI	**Parathyroid Hormone, Intact (PTH-I)**	1.3-9.3 pmol/L	CLIA	3 ml Plain/EDTA, *Fasting morning Separate serum/plasma a.s.a.p. & refrigerated.*	5-7
PB19D	**Parvovirus B19 DNA (by PCR)**	Not Detected	PCR	5 ml Plain Blood / CSF	**7**
PHOS	**Phosphorus, Serum**	0.81-1.45 mmol/L	Phospho-molybdate	5 ml Plain	1
UP	**Phosphorus, Urine**	Adult:300-1300 mg/24hrs; Children:500-800mg/24hrs	Phosphomolybdate Complex	24 hr Urine*, in Acid preservative and Refrigeration*	5
PALB	**Prealbumin**	17-34 mg/dL	Immunoturbidimetric	5 ml Plain	5
PCT	**Procalcitonin (PCT)**	＜0.046 ng/mL	ECLIA	5 ml Plain	7
P1NP	**Procollagen 1 N-Propeptide (P1NP)**	16.27-73.87ng/ml, Post-menopausal: 15.13-58.5 ng/ml	-	5 ml EDTA (Plasma)	**Research, call**
PRG	**Progesterone (P4)**	(nmol/L) Males: 0.45 - 6.55 Mid-Follicular Phase: 0.99 - 4.83 Mid-Luteal Phase: 16.41 - 59.02 Post-Menopausal: < 0.25 - 2.48 1st Trimester: 15.04 - 161.35 2nd Trimester: 61.7 - 144.1	CLIA	5 ml Plain	5
PRL	**Prolactin**	(mIU/L) Males: 2.64-13.13 Premenopausal: 3.34-26.72 Postmenopausal: 2.74-19.64	CLIA	5 ml Plain	3
PACND	***Propionibacterium acnes* DNA (by PCR)**	Not Detected	PCR	Swab	7-14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
PSA	**Prostatic Specific Antigen (PSA)**	Males: 0.0-4.0 ng/ml	CLIA	5 ml Plain	2
PSAF	**Prostate Specific Ag, Free**	0.200-4.900 ng/mL	CLIA	5 ml Plain	5
PHI	**Prostate Health Index (PSA, Fpsa, p2PSA)**	**PHI Value Range** / **Average Cancer Risk** / **Risk of Prostate Cancer with GS ≥ 7** < 25 — 5% — 1.5% 25 - 35 — 7.5% — 3.4% 35 - 55 — 26% — 17%	CLIA	5 ml Plain	5
PROC	**Protein C**	70-140 %	colorimetric method	2x 2 ml Citrate *PC is vitamin K dependant and testing must be performed well after any AVK treatment (1 month). Do not assay in the event of ongoing treatment with a direct-acting oral anticoagulant. Separate plasma & freeze.*	15-20
PROS	**Protein S**	63.5-149.0 %	coagulation method	2x 2 ml Citrate *PS is vitamin K dependant and testing must be performed well after any AVK treatment (1 month). Do not assay in the event of ongoing treatment with a direct-acting oral anticoagulant. Separate plasma & freeze.*	10-12
PEP	**Protein Electrophoresis, Serum**	Albumin 55.8 - 66.1 % α-1 Globulin 2.9 - 4.9 % α-2 Globulin 7.1 - 11.8 % β1-Globulin 4.7 - 7.2 % β2-Globulin 3.2 - 6.5 % γ-Globulin 11.1 - 18.8 % M-Protein (%) 0 %	capillary electrophoresis	5ml Plain	5
UPEP	**Protein Electrophoresis, Urine**	-	gel electrophoresis	20 ml FMU	8-10
PRO	**Protein, Serum**	66-83 g/l	Biuret	5 ml Plain	1

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
UPRO	**Protein, Urine**	Random <10 mg/dL; 50-80 mg/24 hrs	Pyrogallol red	24 hr Urine, *in Refrigeration without acid preservative*	3
PT	**Prothrombin Time (PT/INR)**	<1.3, Therapeutic:2.0-3.0	Stago coagulation system	2 ml Citrate *Do not draw blood from a heparinized line. Avoid contaminating the sample with tissue thromboplastin or heparin. Venipuncture must be performed with no trauma. If blood is drawn from an indwelling catheter, flush with 5 mL of saline and discard the first 5 mL of blood collected. If blood is drawn with a butterfly device, draw a discard tube first to remove air from tubing.*	2
RENC	**Renin Concentration, Total**	Upright:5.1 - 38.7pg/ml, Supine:3.6 - 20.1pg/ml	CLIA	3 ml EDTA (Plasma), *Separate plasma and refrigerate a.s.a.p. Specify patient's posture, upright or recumbent.* *Normal sodium intake & stop medication for 2 days*	7
	Resistin				**Research, call**
RSV	**Respiratory Syncytial Virus (RSV) Ag**	Non-Reactive	RTK	Nasopharyngeal Aspirates	7
RC	**Reticulocyte Count**	0.2 – 2.0%	Blood smear	3 ml EDTA	2
RF	**Rheumatoid Factor (Quantitative)**	<14.1 IU/ml	latex-enhanced immunoturbidimetric	5 ml Plain	2
ROMA	**Risk of Ovarian Malignancy Algorithm (ROMA) (HE4 + CA-125)**	Before Menopausal<7.4% After Menopausal<25.3%	CMIA	5 ml Plain *HE4 and CA125 must be assayed with the same technology.* *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin.* *Essential to stop treatment 8 days before taking the sample.*	7-10
ROTA	**Rotavirus Antigen**	Non-Reactive	RTK	Fresh Stool	2

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
RG	**Rubella IgG**	Immunity: >10; Equivocal: 5-10 IU/mL	CLIA	5 ml Plain	2
RM	**Rubella IgM**	Negative:<0.8, Positive:>1.0	ECLIA	5 ml Plain	5
SARS2R	**SARS Coronavirus Type 2 (SARS-CoV-2) Viral RNA (by rtPCR)**	Not Detected	PCR	Nasopharyngeal & Oropharyngeal Swab in VTM / Sputum/ Brounchial Wash/ Saliva in preservative	Call
SARS2AB	**SARS-CoV-2 Antibodies IgM & IgG (by Rapid Test)**	Non-Reactive	RTK	5 ml Plain	Call
SC2GS	**SARS-CoV-2 S Antibody IgG (by CLIA)** – antibodies agansit receptor binding domain (RBD) of viral spike (S) protein**,** which may be more likely to confer immunity.	Non Reactive: < 50AU/ml (x 0.142 = BAU/mL)	CLIA	5 ml Plain / 3ml EDTA (plasma)	3-5
SARS2AG	**SARS-CoV-2 Antigen (by Rapid Test)**	Non-Reactive	RTK	Nasopharyngeal Swab in Plain tube	Call
SEMA	**Seminal Analysis**	-	WHO guidelines	***Call lab*** / patient to lab *Pre-appointment, specimen must reach lab within 1 hr (State time of collection).*	1
SRT	**Serotonin**			5 ml Plain	**Research, call**
SHBG	**Sex Hormone Binding Globulin (SHBG)**	nmol/L Males: 13.3-89.5 Females (20-46 yrs): 18.2-135.5 Females (47-91 yrs) (Post-menopausal): 16.8-125.2	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	**7**
SPV	**Spermatozoa for Post-vasectomy**		Post-Vasectomy Semen Analysis	***Call lab***/ patient to lab *Specimen must reach lab in 2 hours.*	**1**
SMAG	**Spinal Muscular Atrophy (SMA) Genetic Assay**	Refer to lab	PCR	3 ml EDTA	7-10
SCC	**Squamous Cell Carcinoma Ag (SCC Ag/ TA-4)**	<2.7ng/ml	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin*	**5**

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
				B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.	
STOA	**Stone (Calculi) Analysis**	-	FTIR	Kidney/Biliary Stone	14-21
STBD	***Streptococcus* Group B DNA Detection**	Not Detected	PCR	Swab/ 3ml Blood	5-7
SYFEM	**Synovial Fluid FEME -** Cell count, Gram's stain, protein & crystals	Based on report	-	Synovial Aspirate	2
	Syphilis (refer to *Treponema*)				
FTES1	**Testosterone, Free**	M: 0.17 - 0.66 nmol/L F: 0.006 - 0.055 nmol/L (Non-,menopausal) F: 0.002 - 0.033 nmol/L (Post menopausal)		5 ml Plain	7
TES	**Testosterone, Total**	Male: 5.57 - 24.84 nmol/l Female: < 0.32 - 2.39 nmol/l	CLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	5
THLDA	**Thalassaemia Alpha only DNA Analysis (7 mutations)**		PCR	3 ml Whole/ Cord Blood in EDTA or 10 ml Amniotic Fluid*, Avoid contamination from mother's blood.*	14
THLDB	**Thalassaemia Beta only DNA Analysis (22 mutations)**		PCR	3 ml Whole/ Cord Blood in EDTA or 10 ml Amniotic Fluid, *Avoid contamination from mother's blood*	14
THLD1	**Thalassaemia Alpha & Beta DNA Analysis (adult)**		PCR	3 ml Whole/ Cord Blood in EDTA or 10 ml Amniotic Fluid, *Avoid contamination from mother's blood)*	14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
THLD2	**Thalassaemia Alpha & Beta DNA Analysis (prenatal/neonate)**		PCR	3 ml Whole/ Cord Blood in EDTA or 10 ml Amniotic Fluid, *Avoid contamination from mother's blood*	14
THG	**Thyroglobulin**	3.50-77.00 ng/mL	ECLIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	10
	Thyroglobulin Antibody (refer to Anti-Thyroglobulin)				
	Thyroid Anti-Microsomal Ab (refer to Anti-TPO)				
TBG	**Thyroid Binding Globulin (TBG)**			5 ml Plain	**Research, call**
TSH	**Thyroid Stimulating Hormone (TSH)**		CLIA	5 ml Plain	1
TSHR	**TSH Receptor Antibody**	<15.00%	RIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	7
FT4	**Thyroxine, Free (FT4)**	10.3-24.5 pnol/L	CMIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	1
TPA	**Tissue Polypeptide Ag (TPA)** (non-specific tumour marker)	<75.00 U/L	CLIA	5 ml Plain	7-10

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
TOXG	**Toxoplasma IgG**	Negative:<1.0, Positive:>3.0 IU/mL	ECLIA	5 ml Plain	5
TOXM	**Toxoplasma IgM**	Negative:<0.8, Positive:>1.0 index	ECLIA	5 ml Plain	5
TOXD	***Toxoplasma gondii* DNA**	Not Detected	PCR	5 ml umol/L Plain/ CSF/ Amniotic Fluid	5-7
	TPHA (refer to Treponema Pallidum-Ab test)				
TRA	**Transferrin** (suggest Iron Status Evaluation profil)	2.0 – 3.6 umol/L	Immune-turbidmetric	5 ml Plain, *Fasting sample.*	3
	Transforming Growth Factor Beta-1 (TGF β-1)				Research, call
TPD	***Treponema pallidum* DNA (by PCR)**	Not Detected	PCR	Swab / CSF	7
TPAB	***Treponema pallidum* Ab (TP-Ab)**	Non-Reactive	CLIA	5 ml Plain	3
FTAM	***Treponema*, FTA-Abs IgM**	Negative	FIA	5 ml Plain	10
FTAG	***Treponema*, FTA-Abs total (IgG)**	Negative	FIA	5 ml Plain	10
RPR	**VDRL, Non-treponemal Test (TRUST/RPR Method)**	Non-Reactive	**Agglutination**	5 ml Plain	1
TVD	***Trichomonas vaginalis* DNA (by PCR)**	Not-Detected	PCR	Genital Swab / FVU	7
TG	**Triglycerides**	mmol/L Optimal: < 1.7 Desirable: 1.7 – 2.25 High: 2.26 – 5.64 Very High: > 5.65	Enzymatic, End Point	5 ml Plain, *Fasting sample.*	1
FT3	**Triiodothyronine, Free (FT3)**	2.3-6.3 pmol/L	CMIA	5 ml Plain *Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.*	2

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
TNIH	**Troponin I, High Sensitive Quantitative (hsTnI)**	M: <15.6 pg/ml F: <32.2 pg/ml	LIA	5 ml Plain	3
TRI	**Troponin I (cTnI), Rapid Qualitative**	Negative	RTK	5 ml Plain	1
TNFA	**Tumour Necrosis Factor-Alpha (TNF-α)**	< 8.1 pg/mL	CLIA	5 ml Plain	**Research, call**
UREA	**Urea**	2.8-7.2	Urerase	5 ml Plain	1
	Urea Breath Test (refer to *H Pylori*)				
UUREA	**Urea, Urine**	7-16 g/24 hrs	Urease GLDH	24 hr Urine, *in Refrigeration without acid preservative*	3
URPD	***Ureaplasma spp*. DNA Detection**	Not Detected	PCR	Swab	5-7
UA	**Uric Acid**	Male: 208.3-428.4umol/L Female:154.7- 357umol/L	Uricase	5 ml Plain	1
UUA	**Uric Acid, Urine**	M:250-800 mg/ 24hrs; F:250-750 mg/ 24hrs;	Uricase	24 hr Urin e, *in Refrigeration without acid preservative*	3
UFEM	**Urine FEME / Urinalysis -** *10 chemical parameters & microscopic examination*	Negative /Normal	Full examination analysis	20 ml MSU	1
UPT	**Urine Pregnancy Test (Urine β-hCG), rapid**	Negative	RTK	20 ml Urine	1
VMA	**Vanillylmandelic Acid (VMA)**	1.0-7.5 mg/day	HPLC	24 hr Urine, *in Acid preservative and Refrigeration*	7
VMAR	**Vanillylmandelic Acid (VMA)/Creatinine Ratio**		Calculation	20 ml Urine (random)	7
VZG	**Varicella-zoster IgG (Chicken Pox)**	<150(-) mIU/mL	CLIA	5 ml Plain	8
VZM	**Varicella-zoster IgM (Chicken Pox)**	Negative:<0.8, Positive:>1.0 index	ELISA	5 ml Plain	12
VZD	**Varicella-zoster Virus (VZV) DNA (by PCR)**	Not detected	PCR	Swab / Urine / CSF / Serum	7
	VDRL (refer to *Treponema*)			5 ml Plain, fasting, *wrap, avoid light. Separate serum & freeze.*	14-21
	Vascular Endothelial Growth Factor (VEGF)				Research, call
VA	**Vitamin A (Retinol)**	0.3-0.7 mg/L	HPLC	5 ml Plain	7-10

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
				Interference possible in patients treated with biotin (vitamin B7, B8 or H) or taking any food supplement containing biotin. Essential to stop treatment 8 days before taking the sample.	
VB12	**Vitamin B12 (Cobalamin)**	180-914 pg/ml	CLIA	5 ml Plain, *Separate serum & refrigerate a.s.a.p.*	5-7
VDT	**Vitamin D, Total (25-OH D2 & D3)**	ng/ml Deficient: < 20 Insufficient: 20 to 29 Sufficient: 30-100 Upper Safety Limit: > 100	CLIA		
WEIL	**Weil-Felix Tests (*Rickettsia* Ab /Typhus)**	Non-Reactive	Agglutination	5 ml Plain	1
WET	**Wet Mount Examination** (refer to *Trichomonas*)	Negative	Direct smear	Vaginal Swab in medium	1
WWF	**Widal & Weil-Felix Tests (WWF)**	Non-Reactive	Agglutination	5 ml Plain	1
WT	**Widal Tests (*Salmonella* Ab/Typhoid)**	Non-Reactive	Agglutination	5 ml Plain	1
ZIKAR	**Zika Virus RNA**	Not Detected	PCR	5 ml Plain/ Urine/ CSF	7-10
	Abused Drug tests SCREENING ASSAYS (Qualitative / Quantitative				
AMPH	Amphetamines, by EIA	Negative (Cut-off:1000 ng/mL)	EIA	20 ml Urine	2
AMPHR	Amphetamines, Rapid Screen	Negative	RTK	20 ml Urine	1
BARU	Barbiturates	Negative:<200ng/ml	Enzyme Multiple Immunoassay Test	20 ml Urine	6

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
BENU	Benzodiazepine	< 200 ng/ml	EIA	20 ml Urine	6
CANN	Cannabinoids (THC), by EIA	Negative	EIA	20 ml Urine	2
CANR	Cannabinoids (THC), Rapid Screen	Negative	RTK	20 ml Urine	1
COCU	Cocaine	Negative:<200ng/ml	Enzyme Multiple Immunoassay Test	20 ml Urine	6
NICOT	Cotinin (Nicotine metabolite)	Negative: <0.5ug/ml	Enzymeimmunoassay, Microgenics	20 ml Urine	7
ETH	Ethanol (Ethyl Alcohol)	<30.0, toxic : >200	Enzymatic reaction	5 ml Plain	5
UHER	Heroine	Cut-off : 300 ng/mL	Homogeneous enzyme immunoassay	20 ml Urine	5
KETA	Ketamine	Negative	Competitive Immunoassay	20 ml Urine	5
MTET	Methanol & Ethanol (by LC-MS)	Negative	LC-MS	20 ml Urine	7-12
METHR	Methamphetamines, Rapid Screen	Negative	RTK	20 ml Urine	1
MORP	Morphine/Opiates, By EIA	Negative	EIA	20 ml Urine	2
MORR	Morphine/Opiates, Rapid Screen	Negative	RTK	20 ml Urine	1
METD	Methadone, Quantitative	Negative	RTK	20 ml Urine	6
	Therapeutic Drug Assays				
ACET	Acetaminophen / Paracetamol	Therapeutic concentration: 10–30 µg/mL	Enzymatic/Color (Hydrolysis)	5 ml Plain	5
AMIK	Amikacin	Trough Toxicity Threshold: Children: >5.0 µg/mL Adults: >10.0 µg/mL Peak Toxicity Threshold: >30.0 µg/mL	Enzyme Multiple Immunoassay Test (EMIT)	5 ml Plain	5
CARB	Carbamazepine (Tegretol)	4-12 ug/mL ; Toxic : >12 ug/mL	Enzymatic/Color (Hydrolysis)	5 ml Plain	5
CCSA	Cyclosporin A	0.62-1.11 mg/L	Nephelometry	3 ml EDTA Plasma	5

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
DIG	Digoxin (Lanoxin)	Adult : 1.0-2.0 ng/mL ; children : 1.1–1.7 ng/mL ; Toxic : >2.0 ng/mL	CLIA	5 ml Plain	5
FK506	FK506 (Tacrolimus)	5.0-20.0 ng/mL	Particle Enhanced Turbidimetric Inhibition Immunoassay (PETINIA)	3 ml EDTA	5
GENT	Gentamycin	4.0-10.0 µg /mL at peak Trough : >2.0 µg/mL	Particle Enhanced Turbidimetric Inhibition Immunoassay (PETINIA)	5 ml Plain	5
LIT	Lithium	<1.5mmol/L	Colorimetric/ Endpoint	5 ml Plain	5
MTT	Methotrexate (MTX)	Toxic : 24hr >10; 48hr >1.0; 72hr >0.1 umol/L	CLIA	5 ml Plain	5
PNB	Phenobarbital (Luminal)	10-40 ug/mL	Homogeneous enzyme immunoassay	5 ml Plain	5
PNT	Phenytoin (Dilantin)	10-20 ug/mL ; Toxic : >20 ug/mL	Homogeneous enzyme immunoassay	5 ml Plain	5
SIRO	Sirolimus (Rapamycin)	Sirolimus Treatment : Trough : 2 mg/day treatment : 4.5 - 14 ng/Ml Trough : 5 mg/day treatment : 10 - 28 ng/mL Sirolimus and Cyclosporine Treatment : Trough: 6.3 - 16.0 ng/mL Cyclosporine Withdrawal : Trough : 17.0 - 29.0 ng/mL	Chemiluminescen t Microparticle ImmunoAssay	3 ml EDTA	7
TPL	Theophylline (Aminophylline)	10-20 ug/mL ; Toxic : >20 ug/mL	Homogeneous enzyme immunoassay	5 ml Plain	5

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
VALA	Valproic Acid (Depakine)	50-100 ug/mL ; Toxic : >100 ug/mL	Homogeneous enzyme immunoassay	5 ml Plain	5
VANC	Vancomycin	Trough : 5-10 ug/mL ; Toxic:Trough: >10 ug/mL Peak : 20-40 ug/mL ; Toxic: Peak: >40 ug/mL	Homogeneous enzyme immunoassay	5 ml Plain	5
	Chemical Hazards				
ACETU	Acetone, Urine	1 ppm, 0.61 mg/g creatinine, 17 mg/dL	In House Method based on QWI OG17-93	20 ml Urine	7-14
CHL1	Cholinesterase, RBC (long term exposure to Pesticides)	20-72 uM/sec/L of W.B.	Enzyme substrate	3 ml EDTA/Heparin	7-14
CHL	Cholinesterase, Serum (acute exposure to Pesticides)	M: 4.62-11.50 KU/L F: 3.93-10.80 KU/L	Butyrylthiocholine	5 ml Plain	3
CYANU	Cyanide, Urine (may consider plasma Lactate)			20 ml Urine	7-14
SPMA	Benzene (as S-Phenylmercapturic Acid SPMA in Urine)	<25 µg/g creatinine	In House Method based on QWI CH17-81	20 ml Urine	7-14
BENZ	Benzene (as Phenol in Urine)	< 50 µg/g creatinine	HPLC	20 ml Urine	7-14
FLUU	Fluoride, Urine	17 mg/dL, 0.01 mg/L, 0.5 mg/g creatinine	Clinical Chemistry Analyzer, NIOSH 8303	20 ml Urine	7-14
FORMU	Formaldehyde, Urine	50 ppb	In House HS-GCMS Method	20 ml Urine	7-14
MEKU	Methyl Ethyl Ketone (MEK) in Urine	17 mg/dL, 100 ppb, 60.6 µg/g creatinine	In House Method based on QWI OG17-93	20 ml Urine	7-14

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
HEX	n-Hexane (as 2,5-Hexanedione in Urine)	0.4 mg/L, 0.24 mg/g creatinine, 17 mg/dL	In House Method based on QWI CH17-114	20 ml Urine	7-14
PRQ	Paraquat, Serum	<0.1 ppm	Colorimetric method		7-10
PRQU	Paraquat, Urine	<5 ppm	Colorimetric method	20 ml Urine	7-10
STYRU	Styrene (as Mandelic Acid in Urine)	17 mg/dL, 10 µg/L, 6.06 µg/g creatinine	In House HS-GCMS Method	20 ml Urine	7-14
TOLU	Toluene (as Hippuric Acid in Urine)	17 mg/dL, 0.5 ppm, 0.005 g/g creatinine	In House Method based on QWI CH17-127	20 ml Urine	7-14
TCA	Trichloroethylene (as Tricholoacetic Acid in Urine)	17 mg/dL, 10 mg/L	In-House Method	20 ml Urine	7-14
XYL	Xylene (as Methylhippuric Acid), Urine	1.5 g/g creatinine	NIOSH 8301	20 ml Urine	7-14
	Trace & Toxic Elements				
ALU	Aluminium (Al), Blood	< 5.9 ug/L	ICP-MS	5 ml TET Heparin	7-10
ALUU	Aluminium (Al), Urine	<50 ug/g cre	LC-MS/MS	10 ml Urine	7-14
ARS	Arsenic (As), Blood	Not Detected (<0.06)	ICP-MS	5 ml EDTA	14-20
ARSU	Arsenic (As), Urine	<77.8 ug/g cre	ICP-MS	10 ml Urine	14-20
ARSU2	Arsenic (AS), Inorganic in Urine	<77.8 ug/g cre	LC-MS/MS	10 ml Urine	7-14
CADM	Cadmium (Cd), Blood	<5 ug/L	ICP-MS	5 ml EDTA	7-14
CADMU	Cadmium (Cd), Urine	<5 ug/g cre	LC-MS/MS	10 ml Urine	7-14
CHRB	Chromium (Cr), Blood	<1.2 ug/L	ICP-MS	5 ml EDTA	7-14
CHRU	Chromium (Cr), Urine	<55.6 ug/g cre	LC-MS/MS	10 ml Urine	7-14
COBB	Cobalt (Co), Blood		ICP-MS	5 ml EDTA	7-14
COBU	Cobalt (Co), Urine		LC-MS/MS	10 ml Urine	7-14
COP	Copper (Cu), Serum	700-1500 ug/L	Atomic Absorption	5 ml TET Heparin	7-14
COPU	Copper (Cu), Urine	24Hr: <60 ug ; Random: <80 ug/dL	LC-MS/MS	10 ml Urine	7-14
PB	Lead (Pb), Blood	<50ug/dl	ICP-MS	5 ml EDTA	7-10

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
UPB	Lead (Pb), Urine	<5 ug/g cre	LC-MS/MS	10 ml Urine	7-10
MNBL	Manganese (Mn), Blood	129 -189 umol/L	ICP-MS	5 ml EDTA	7-14
MNU	Manganese (Mn), Urine	<19 ng/l	AAS	10 ml Urine	7-14
HG	Mercury (Hg), Blood	<74.8 nmol/L	LC-MS/MS	5 ml EDTA	7-14
UHG	Mercury (Hg), Urine	<20 ug/g cre	ICP-MS	10 ml Urine	7-14
NIBL	Nickel (Ni), Blood	0.34 -1.4 ug/dl	ICP-MS	5 ml EDTA	7-14
NIU	Nickel (Ni), Urine	<18.2 ug/g creatinine	ICP-MS	10 ml Urine in TET Plain	7-14
ZN	Zinc (Zn), Serum	700-1200 ug/L	Atomic Absorption	5 ml TET Heparin	7-14
ZNU	Zinc (Zn), Urine			10 ml Urine	7-14
	Cytopathology				
PAP	PAP Smear	-	Papanicolaou staining method	Fixed smear	4-6
PALP	PAP Test, Liquid-based preparation			Cervical brush in collection kit	4-6
CY04	Smear - sputum, brushing etc.			Fixed smear	5-7
CY05	Fluid - urine, washing, secretion, body fluid etc			In Sterile Container	5-7
CY06	Fine Needle Aspirate Cytology			Relevant fixed smears	5-7
HP01	Small Specimen/Biopsy (<3cm) - Endometrial curretings, Appendix, Fallopian tubes, Gall bladder, Vas deferens, Lymph nodes, Skin biopsies, Prostatic biopsies, single Ovary, single Tonsil, Cervical punch/ Colposcopic biopsies, Gastro-intestinal tract biopsies.			10% buffered formalin fixed tissue Specimen must be accompanied with appropriate and relevant clinical data. The specimen container must be labelled with patient's identification and anatomic site of the sample.	5-7
HP02	Medium Specimen (<6cm)			10% buffered formalin fixed tissue	5-7

Code	Name of Test	Reference range	Methodology	Type of Specimen	TAT (Days)
	- Prostatic chips (TURP), Cervical Cone biopsies, Simple Mastectomy, Uterus (without ovaries), Brest Lump, Lumps etc			Specimen must be accompanied with appropriate and relevant clinical data. The specimen container must be labelled with patient's identification and anatomic site of the sample.	
HP03	Large Specimen (>6 cm) - Bladder, Breast Mastectomy, Caecum, Cervical Cone Biopsy, Colectomy, Gastrectomy, Intestine, Kidney, Liver, Uterus with tubes & ovaries, etc			10% buffered formalin fixed tissue Specimen must be accompanied with appropriate and relevant clinical data. The specimen container must be labelled with patient's identification and anatomic site of the sample.	7-10
HP04	Large Complex/Radical Specimen Contact the lab for specific charges - Wertheim's hysterectomy, TAHBSO with entire cervix, etc			10% buffered formalin fixed tissue Specimen must be accompanied with appropriate and relevant clinical data. The specimen container must be labelled with patient's identification and anatomic site of the sample.	CALL
	Immunohistochemisty (IHC) & Special Stains			Contact us for more information on stains available and charges.	CALL

Remarks:

RIA	-	Radioimmunoassay
HPLC	-	High-Performance Liquid Chromatography
CLIA	-	Chemiluminescent Immunoassay
ELISA	-	Enzyme-Linked Immunosorbent Assay
FLISA	-	Fluorescent-linked Immunosorbent Assay
ECLIA	-	ElectroChemiLuminescence ImmunoAssay
RTK	-	Rapid test kit
CLEIA	-	Chemiluminescent Enzyme ImmunoAssay
SRID	-	Single Radial Immunodiffusion
PCR	-	Polymerase Chain Reaction
EIA	-	Enzyme ImmunoAssay
LC–MS	-	Liquid Chromatography – Mass Spectrometry
ICP-MS	-	Inductively Coupled Plasma – Mass Spectrometry
AAS	-	Atomic Absorption Spectrosc