



*Leader in Health Check*

# 2017

## BP Clinical Laboratory Service Guide



### **B.P. Clinical Lab Sdn. Bhd**

Company No: 152314-H

Address: Glenmarie Lab

No: 2, Jalan Pendafatar U1/54, Section U1,

Temasya @ Glenmarie

40150 Shah Alam, Selangor Malaysia

Tel: 603-55699996; Fax: 603 -55696827

This BP Clinical Laboratory Service Guide 2017 was prepared by the staff of BP Clinical Lab Sdn . ( Glenmarie Branch) It has been approved for use by Dato Beh Chun Chuan , Chairman of BP Healthcare Group .

It is a revised version of the BP Clinical Laboratory Service Guide 2015



## CHAIRMAN'S MESSAGE

2017 marks BP Healthcare Group's (BPHG) 35th year in business as an established healthcare household brand in Malaysia, providing the widest range of primary and secondary healthcare services. It has been a long and remarkable journey, but our experience thus far is just the tip of the iceberg on our potential to serve our healthcare consumers better.

For over three decades, BPHG has focused on establishing its bricks and mortar as Malaysia's first choice of healthcare services provider. In the last decade however, BPHG switched gears to explore more innovative development by investing in enhanced digital software, improved hardware, and more advanced equipment and infrastructure to go beyond the expectations of our healthcare consumers. Online services including live chat features, report collection and tracking as well as market-leading mobile applications were introduced in order to make our healthcare services a wholly-accessible consumer experience.

BP Specialist and BP Diagnostic Centres were even better equipped to replace older models to function seamlessly with our improved systems and infrastructure, and continuous methodological staff training was integrated. A number of Diagnostic Centres have been upgraded to Specialist Centres. Such efforts take us a step further in the industry as a one-stop centre for quality healthcare services.

Serving as a one-stop quality healthcare centre does not mean we are limited geographically. Recently, Mobile Audiology and Radiology services were also introduced to cater for healthcare consumers who face difficulty in travelling from their homes to carry out medical examinations.

BPHG seeks to become an all-round service provider in the healthcare industry, from the top of the supply chain to the very end. Hence clinical waste logistics operations were also introduced last year to help our supporting public and private healthcare providers like hospitals, clinics, dialysis centres, medical laboratories, pharmacy outlets and dental clinics to manage their waste collection according to specifications and regulations issued by the World Health Organisation and international law.

Our medical laboratories, BP Clinical Lab, are also constantly upgrading their testing methods and sustaining accreditations with ISO 15189 and international JCI status. New cancer and genetics testing were introduced. Last year, Mayo Medical Laboratories, a renowned global reference laboratory based in America, officially appointed BP as the joint representative collection centre for referral services.

Our food and environmental testing laboratories, BP Food Testing and BP Environmental Testing, continue to recruit specialised experts and invest in equipment to cater to a wider field of testing as prescribed by the government as well as international authorities in order to meet the standards imposed on food and environmental safety.

In line with our move towards technological innovation, our Doctor2U mobile application was introduced late 2015 and it was primarily aimed at revolutionising the traditional doctor house-call to become a “Doctor On Demand” system simply through the touch of a button, much like how Uber operates for transportation services. Within its first year of launch, Doctor2U has drastically improved and continues to customise its features to meet new customer challenges. Today the application is a comprehensive and completely accessible healthcare portal!

BPHG has proudly exceeded its prior status as a nationwide healthcare provider by securing a foothold in medical, food and environmental and teleradiology service industries beyond Malaysian shores! It has long been the aspiration of BPHG to expand its business beyond borders and be a prominent international healthcare provider. We are ready!

2016 represents a fruitful year for BPHG, with many milestones and great progress. For this the management would like to thank our loyal healthcare consumers, supporters, suppliers and the Malaysian government for their support. Last but not least, a heartfelt thank you to our dedicated colleagues and staff who have taken BPHG to great heights, and whom I am confident will continue to contribute to the success of BP Healthcare Group.

## Table of Contents

OVERVIEW of BP HEALTHCARE GROUP.....	7
OVERVIEW OF BP CLINICAL LABORATORY .....	9
BP OUTLETS .....	10
CONTACT INFORMATION .....	17
SECTION I: Policies, Guidelines, Sample Collection, Packaging and Transportation, and Special Procedures .....	18
GENERAL POLICIES.....	19
GENERAL REQUIREMENTS.....	19
TEST REQUEST .....	19
PATIENT PREPARATION AND INFORMATION.....	20
LABORATORY REQUEST FORM.....	21
SAMPLE LABELS .....	22
SAMPLE COLLECTION .....	23
PACKAGING THE SAMPLES.....	24
SAMPLE STORAGE .....	25
SAMPLE TRANSPORTATION TO LABORATORY.....	26
COMMUNICATION WITH THE LABORATORY .....	26
TURNAROUND TIME.....	27
HANDLING OF TEST RESULTS.....	29
CRITICAL LABORATORY VALUES.....	30
WHO GUIDELINES ON DRAWING BLOOD: BEST PRACTICES IN PHLEBOTOMY .....	34
BLOOD SAMPLE COLLECTION .....	39
SPECIMEN REQUIREMENTS FOR OPTIMAL RESULTS .....	43
SPECIFIC SAMPLE COLLECTION .....	48
SPECIAL PROCEDURES FOR BIOCHEMISTRY TESTS.....	48
24-Hour Urine Collection .....	49
24-Hour Urine Catecholamines .....	49
Lactate .....	50
Ammonia .....	51
SPECIAL PROCEDURES FOR MICROBIOLOGY TEST .....	51
General Guidelines for Proper Specimen Collection and Transport .....	51
Special Instructions .....	52
Urine Culture .....	52
Blood Culture.....	53
Nasal Swab .....	54

Genital Infections Sexually Transmitted Diseases .....	55
Specimens Required .....	55
Genital tract swabs .....	55
High Vaginal Swabs .....	55
Cervical Swabs .....	56
Urethral Swabs.....	56
Intrauterine Contraceptive Devices (IUCDs).....	56
Rectal Swabs .....	56
Pus Samples/ Wound Swabs.....	56
Abscess .....	57
Eye Swab.....	58
Throat Swab .....	58
BLOOD FILMS FOR PARASITOLOGY .....	58
BLOOD SMEAR PREPARATION FOR HAEMATOLOGY .....	60
SPECIAL PROCEDURES FOR HISTOPATHOLOGY/CYTOLOGY TEST .....	61
<b>Histopathology</b> .....	61
<b>Gynaecological Pap Smears (Pap Test)</b> .....	62
Non-Gynaecological Cytology .....	66
Air Drying Smears.....	66
Sputum Collection.....	66
FNAC Technique for Solid Lesions.....	66
FNAC of Cystic Lesions .....	67
SECTION II: Alphabetical listing of tests .....	68
Appendix A: PATHOLOGY REQUEST FORMS.....	101



## OVERVIEW of BP HEALTHCARE GROUP

Established in 1982, BP Healthcare Group has gone through over 32 years of innovation and transformation. Today, BP Healthcare Group has over:

- 70 Laboratories
- 50 Diagnostic centres
- 50 Hearing Aids centres
- 50 Dispensaries & Pharmacies
- 50 Food and Industrial Testing centres
- 5 Specialist/ Daycare Centres
- 3 Dental Specialist clinics
- 1 Eye Specialist Clinic



With this network nationwide (and still expanding), multiple awards and credentials earned, BP Healthcare Group is a leader in the Malaysia Private Healthcare Industry, serving more than 35 million customers over the last 30 years and the number is growing. We provide comprehensive primary health care services in all disciplines to cover the needs of Medical Practitioners, Hospitals and Corporate Clients. With capabilities across the entire spectrum of primary healthcare services, BP Healthcare Group can drive improvement in health status and lower the overall costs to healthcare, more effectively than anyone else in this industry. BP Healthcare Group has undergone aggressive expansion and transformation since its establishment in 1982. The group has grown from strength to strength in tandem with the nation's rapid growth.

Today, the group is proud to have become one of the country's leading integrated healthcare providers with core competence and innovative strength in medical diagnostics, clinical laboratory and medical technologies, complemented by other specialized primary healthcare services. The

group has remained relentless in its pursuit of healthcare services of the highest quality for its customers. To this end the group continues to strive towards providing excellence healthcare services through a concerted and committed effort in continuous improvement, investing in state-of-the art medical devices and equipment, competent and dedicated human resource and investment in ICT.

## **VISION**

To be the largest integrated and comprehensive private healthcare provider in the country, with the core strengths in diagnostics and medical services, and providing healthcare of the highest quality to its customers to enhance quality of life of Malaysian

## **MISSION**

To achieve the Vision, BP Healthcare Group strives to:

1. Prosper healthy partnerships with public and private healthcare providers, and other related agencies to enhance delivery of integrated and comprehensive healthcare services and be a leader in health check.
2. Gain and retain customers' trust and loyalty through meeting and exceeding their expectation
3. Invest in human potential to achieve a high competent workforce
4. Commit towards innovative technologies to advance the diagnostics and medical services
5. Create conducive work environment to enhance safety and productivity of its workforce

## **VALUES**

To uphold the Vision and Mission, BP Healthcare Group believes in:

1. Customer first
2. Professionalism
3. Teamwork
4. Integrity
5. Accountability
6. Effective communication
7. Continuous improvement
8. Efficient
9. No blame culture

## **GOALS**

BP Healthcare Group aims to annually:

1. Increase market share
2. Increase market expansion beyond Malaysia
3. Increase productivity
4. Increase positive customer feedback
5. Increase in number of workforce who are knowledgeable and skillful
6. Increase investment in innovative technology





## OVERVIEW OF BP CLINICAL LABORATORY

B.P. Clinical Lab Sdn. Bhd. (BP Clinical Lab) commenced its business as a provider of medical laboratory testing services and analyses in the 1980's.

Through our network of laboratories, BP currently serves thousands of private medical practitioners, private and public hospitals throughout the country and generates millions of test results. BP Lab also serves as a panel laboratory for some corporations and insurance companies.

The source of our strength is our team of highly qualified and competent professional staff comprising of a panel of experienced pathologists, hundreds of professional medical technical staff and ancillary support.

Test methodologies, media and laboratory equipment are constantly being evaluated and updated to keep abreast with the state-of-the-art instrumentation and to improve efficiency of test procedures with faster turnaround time. With our philosophy of meeting challenges through continuous delivery of quality service and assurance of customer satisfaction, BP Lab has today become one of the leading key players in the clinical laboratory.

Through our adaptability and responsiveness to changes and our culture of work excellence, we are confident that we can maintain our reputation and position in the coming years.

BP Clinical Lab is proud to have achieved the following:

1. Joint Commission International (JCI) Clinical Laboratory Accreditation (BP Clinical Lab (Glenmarie) is the 1<sup>st</sup> clinical laboratory in Asia to be accredited by JCI)
2. ISO/IEC17025 for blood lead
3. MS ISO 9001:2000 certification for BP (HQ).
4. MS ISO 15189:2008 accreditation


### BP Laboratory Branches

Main Laboratory	Area Coverage
BP Clinical Lab Sdn Bhd, Ipoh	Northern, Central, Kota Bharu and Kuala Terengganu
BP Clinical Lab Sdn Bhd , Glenmarie	Metro, Southern and East Malaysia branches, Kuantan, Mentakab and Bentong
Cytopathology Lab, Penang	Northern, Central and East Coast branches
BP Food Testing Sdn Bhd, Butterworth	All branches (Occupational Health Testing & Food Samples)
BP Environmental Testing Sdn Bhd, Subang Jaya	All branches (Water & Waste water samples)

# BP OUTLETS

## LEGENDS

**SC** Specialist Centre  
**HA** Hearing

**DC** Diagnostic Centre  
 Dispensary

**LAB** LAB

## KUALA LUMPUR

### Kepong

**DC** + **LAB** + **HA** + 

No. 23, Jalan Metro Perdana Barat 1,  
Taman Usahawan Kepong,  
Kepong Utara, Kepong,  
52100 Kuala Lumpur.  
Tel: 03-62593884, 03-62593885  
Fax: 03-62593887

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Sat, Sun & Public Holiday : 8.00 am – 1.00 pm

### Cheras

**SC** + **LAB** + **HA** + 

No 37, 39, 41 & 43, Jalan 4/96A,  
Taman Cheras Makmur, Cheras,  
56100 Kuala Lumpur.  
Tel: 03-91309163, 03-91308301  
Fax: 03-91411392

#### Operation Time :

Monday to Friday : 7.30 am – 5.00pm  
Saturday, Sunday & Public Holidays : 7.30 am – 1.00 pm

### OUG

**DC** + **LAB** + **HA** + 

No. 82 Jalan Mega Mendung,  
Bandar Park, Batu 5,  
Jalan Kelang Lama,  
58200 Kuala Lumpur.  
Tel: 03-79802061, 03-79802079  
Fax: 03-79802180

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

### Pudu

**DC** + **LAB** + **HA** + 

No. 458, Jalan Pudu,  
55100 Kuala Lumpur  
Tel: 03-92222800, 03-92222801  
Fax: 03-92222802

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Kuala Lumpur

**DC** + **HA** + 

No. 16, Persiaran 65C,  
Pekeliling Business Centre,  
Off Jalan Pahang Barat,  
53000 Kuala Lumpur.  
Tel: 03-40210041, 03-40210161  
Fax: 03-40210722

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday: 8.00 am – 1.00 pm  
Sun & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## SELANGOR

### Glenmarie (Shah Alam)

**SC** + **LAB** + **HA** + 

Lot 2, Jalan Pendaftar U1/54,  
Section U1, Temasya @ Glenmarie,  
40150 Shah Alam,  
Selangor, Malaysia.  
Tel: 03-55699996, 03-55696826, 03-55690936  
Fax: 03-55696829, 03-56352855, 03-55696827

#### Operation Time :

Monday- Friday : 7am-5pm  
Consultation hours :8.00 am - 5.00 pm  
Saturday, Sunday & Public Holiday : 7.30 am - 1.00 pm

### Rawang

**DC** + **LAB** + **HA** + 

No 7 & 9,  
Jalan Bandar Rawang 10,  
Pusat Bandar Rawang,  
48000 Rawang, Selangor.  
Tel : 03-60931333, 03-60926451  
Fax: 03-60931555

#### Store Hours :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday : Closed  
\*Closed on 12 public holidays

### Kajang



No. 40&41, Jalan Tukang,  
43000 Kajang, Selangor  
Tel : 03-87337433 , 03-87364553  
Fax: 03-87343295

#### Store Hours :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : 8.00 am – 1.00 pm

### Taman Megah



No. 79, Jalan SS 23/15, Taman SEA,  
47400 Petaling Jaya, Selangor.  
Tel: 03-78030992  
Fax: 03-78030913

#### Store Hours :

Monday to Friday : 7.30 am – 5.00pm  
Saturday, Sunday & Public Holiday : 7.30 am – 1.00 pm

### Subang Jaya



No. 3 & 5, Jalan SS15 / 4E,  
47500 Subang Jaya, Selangor  
Tel : 03-56329473, 03-56323123  
Fax: 03-56335062

#### Store Hours :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

### Klang



104, Leboh Turi, Taman Chi Liung,  
41200 Klang, Selangor.  
Tel: 03-33724748, 03-33718637  
Fax: 03-33724723

#### Operation Time :

Monday to Friday : 7.30 am – 5.00pm  
Saturday : 8.00 am - 1.00 pm  
Sunday & Public Holidays : Closed  
\*Closed on 12 public holidays and 52 sundays

### Klang II



No. 29, Jalan Bayu Tinggi 1A/KS6,  
Taman Bayu Tinggi, 41200 Klang, Selangor  
Tel : 03-33239169, 03-33249169  
Fax: 03-33221976

#### Store Hours :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 7.30 am - 1.00 pm

### Seri Kembangan



No. 1 & 3, Ground Floor,  
Jalan Besar Susur 1,  
43300 Seri Kembangan, Selangor.  
Tel : 03-89599924, 03-89599983  
Fax: 03-89389766

#### Store Hours :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sunday

## PENANG

### Bukit Mertajam



No. 62-63 (Ground Floor), Jalan Aston,  
14000 Bukit Mertajam, Penang  
Tel: 04-5375889, 04-5377889  
Fax: 04-5374889

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

### Butterworth



5001 & 5002, Jalan New Ferry,  
12100 Butterworth, Penang.  
Tel: 04-3246722, 04-3327944  
Fax: 04-3239508

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday , Sunday & Public Holiday : 8.00 am – 1.00 pm

### Bayan Lepas



Ideal Avenue, 1-1-1, Medan Kampung Relau 1,  
Jalan Tun Dr. Awang,  
11900 Bayan Lepas, Penang.  
Tel: 04-6410382, 04-6410803  
Fax: 04-6410801

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday : Closed  
\*Closed on 12 public holidays

### Penang



Suite G1 & G2, Menara Penang Garden,  
42A Jalan Sultan Ahmad Shah, 10050 Penang  
Tel: 04-2292677, 04-2263160  
Fax: 04-2272886

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

## Penang II



Suite 4-2 & 4-3, Menara Penang Garden,  
42A, Jalan Sultan Ahmad Shah,  
10050 Penang  
Tel: 04-2264416, 04-2292323  
Fax: 04-2292675

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

## JOHOR

### Batu Pahat



No.5-2,(Tingkat Bawah) Jalan Zabadah,  
84000 Batu Pahat,  
Johor Darul Takzim  
Tel: 07-4311759, 07-4348813, 07-4348893  
Fax: 07-4317400

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holidays : 8.00 am – 1.00 pm

### Johor Bahru



No. 67 & 67A Jalan Harimau Tarum,  
Taman Century,  
80250 Johor Bahru, Johor  
Tel: 07-3348723, 07-3348722  
Fax: 07-3348623

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday : Closed  
\*Closed on 12 public holidays

### Kluang



No. 18 & 20, Jalan Haji Manan,  
86000 Kluang, Johor  
Tel: 07-7715469, 07-7717133, 07-7760435 (Lab)  
Fax: 07-7715487

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday : Closed  
\*Closed on 12 public holidays

### Muar



No. 34, Jalan Bakri,  
84000 Muar,  
Johor Darul Takzim  
Tel : 06-9512624, 06-9533485  
Fax: 06-9534135

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday : Closed  
\*Closed on 12 public holidays

### Segamat



No 121 & 122, Jalan Genuang,  
85000 Segamat, Johor.  
Tel: 07-9312980 / 07- 07-9311210 (DC), 07-9313027 (lab)  
Fax: 07-9320982

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday ; 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Johor Jaya



No. 53-G, Jalan Rosmerah 2/10,  
Taman Johor Jaya, 81100 Johor Bahru, Johor  
Tel : 07-3530325, 073532923  
Fax: 07-3510018

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holidays : 8.00 am – 1.00 pm

### Kulai Jaya



No. 18 & 19,  
Jalan Raya, Taman Seraya,  
81000 Kulai Jaya, Johor  
Tel: 07-6635697, 07-6625477  
Fax: 07-6621679

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sunday

### Skudai



Tower 1, No. 68, Jalan Pertama 1,  
Danga Utama Commercial Center,  
81300 Skudai Johor Bahru  
Tel : 07-5500317, 07-5500323, 07-5500331, 07-5500315 (Lab)  
Fax : 07-5500329

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holidays : 7.30 am – 1.00 pm

## PERAK

### Ipoh



No. 275, Jalan Raja Permaisuri Bainun (Jalan Kampar),  
30250 Ipoh, Perak,  
Malaysia  
Tel: 05-2559090, 05-2553442, 05-2418484, 05-242 8850  
Fax: 05-2419226, 05-2426888, 05-2439196

#### Operation Time:

Monday- Friday : 7.00 am - 5.00 pm  
Saturday - Sunday : 7.00 am - 1.00 pm  
Public Holiday : 7.00 am - 1.00 pm

### Kampar



No. 6, Jalan Kranji,  
31900 Kampar, Perak.  
Tel : 05-4669784  
Fax : 05-4652916

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Sitiawan



Lot 287 & 288 (Ground Floor),  
Lot Kosong, Jalan Lumut,  
32000 Sitiawan, Perak  
Tel: 05-6923233, 05-6911060  
Fax: 05-6926233

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Taiping



No. 178 & 180 Jalan Kota,  
34000 Taiping, Perak  
Tel : 05-8069907, 05-8201344  
Fax : 05-8201345

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Tanjung Malim



No. 46, Jalan Besar,  
35900 Tanjung Malim, Perak  
Tel : 05-4598522, 05-4599522  
Fax : 05-4585992

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Sat : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Teluk Intan



No. 15 Jalan Intan 2 (Ground Floor),  
Bandar Baru Teluk Intan,  
Jalan Chongkat Jong,  
36000 Teluk Intan, Perak  
Tel: 05-6218205, 05-6214607  
Fax: 05-6214605

#### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Parit Buntar



No. 11 & 13 Jalan Wawasan 1,  
Taman Wawasan Jaya,  
34200 Parit Buntar, Perak.  
Tel: 05-7161262, 05-7165262  
Fax: 05-7176478

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## KEDAH

### Alor Setar II



No. 30 & 32 (Ground Floor),  
Jalan Putra, 05150 Alor Setar, Kedah  
Tel: 04-7325641, 04-7315641  
Fax: 04-7335641

#### Operation Time :

Sunday to Thursday : 7.30 am – 5.00 pm  
Friday & Saturday : 8.00 am – 1.00 pm  
Public Holiday: Closed  
\*Closed on 12 public holidays

### Sungai Petani



No. 22 (Ground Floor & First Floor),  
Jalan Ibrahim, 08000 Sungai Petani, Kedah.  
Tel: 04-4258389, 04-4254940  
Fax: 04-4292096

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday & Sunday : 8.00 am – 1.00 pm  
Public Holiday: Closed  
\*Closed on 12 public holidays

## NEGERI SEMBILAN

### Seremban



No. 178 & 179 (Ground & Mezz Floor),  
Jalan Dato'Bandar Tunggal,  
70000 Seremban, Negeri Sembilan.  
Tel: 06-7616163, 06-7614188, 06-7626813 (lab)  
Fax: 06-7661653

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

### Seremban II



No. 38, Jalan S2 B 18 Biz Avenue, Seremban 2,  
70300 Seremban, Negeri Sembilan  
Tel: 06-6012057, 06-6012072  
Fax: 06-6012793

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Bahau



No. 107 Ground Floor, Jalan Dato' Komo, 72100 Bahau, Negeri Sembilan  
Tel : 06-4542596  
Fax : 06-4541932

#### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## MELAKA

### Melaka



No. 113 & 114, Jalan Merdeka,  
Taman Melaka Raya, 75000 Melaka  
Tel: 06-2869902  
Fax: 06-2850296

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

## KELANTAN

### Kota Bharu



Lot 795 & 796, Tingkat Bawah, Seksyen 27,  
Jalan Kebun Sultan,  
15200 Kota Bharu, Kelantan  
Tel: 09-7478158, 09-7471501  
Fax: 09-7471504

#### Operation Time :

Sunday to Thursday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Friday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## PAHANG

### Bentong



No. 66 Ground Floor, Jalan Ah Peng,  
28700 Bentong, Pahang  
Tel: 09-2235453  
Fax: 09-2211081

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Mentakab



No 61-A, Ground Floor, Jalan Temerloh,  
28400 Mentakab, Pahang.  
Tel: 09-2781108, 09-2771645  
Fax: 09-2771646

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Kuantan



A255, Ground and Mezzanine Floor,  
Jalan Beserah, 25300 Kuantan, Pahang.  
Tel: 09-5662367, 09-5672367  
Fax: 09-5672361

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

## PERLIS

### Kangar



No. 6 Jalan Jubli Perak, 01000 Kangar, Perlis  
Tel: 04-9773285, 04-9770623  
Fax: 04-9770618

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## TERENGGANU

### Kuala Terengganu



134-C(Ground Floor),  
Jalan Sultan Zainal Abidin,  
20000 Kuala Terengganu, Terengganu  
Tel: 09-6221210  
Fax: 09-6248154

#### Operation Time :

Sunday to Thursday : 8.00 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Friday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

## SARAWAK

### Kuching



Lot 127, Section 51, 4 Jalan Song Thian Cheok, and  
Lot 128, Section 51, 2 Jalan Song Thian Cheok,  
93100 Kuching, Sarawak  
Tel: 082-237037, 082-237219  
Fax: 082-237477

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday, Sunday & Public Holiday : 8.00 am – 1.00 pm

### Sibu



Ground and First Floor, 17E & 17F,  
Jalan Pedada, 96000 Sibu, Sarawak  
Tel: 084-317075, 084-317081  
Fax: 084-316057, 084-317075

#### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed  
\*Closed on 12 public holidays and 52 sundays

### Kuching II



No. 11 Ground Floor,  
Jalan Song Thian Cheok,  
93100 Kuching, Sarawak  
Tel: 082-231964  
Fax: 082-230932

#### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed

### Miri



Lot 1268, Ground Floor, Jalan Melayu,  
Centrepoint Commercial Centre Phase 1,  
98000 Miri, Sarawak  
Tel: 085-441622, 085-418202, 085-441433  
Fax: 085-441434

#### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm  
Saturday : 8.00 am – 1.00 pm  
Sunday & Public Holiday : Closed



\*Closed on 12 public holidays and 52 sundays

## Bintulu



Lot 4205, Bintulu Parkcity Commerce Square (Phase 6),  
Jalan Tun Ahmad Zaidi,  
97000 Bintulu, Sarawak  
Tel: 086-330064, 086-335172

### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm

Saturday : 8.00 am – 1.00 pm

Sunday & Public Holiday : Closed

\*Closed on 12 public holidays and 52 sundays

## SABAH

### Lintas



Lot 26 (DBKK Lot 19-0), Ground Floor,  
Block D, Lintas Square, Jalan Lintas,  
88300 Kota Kinabalu, Sabah  
Tel: 088-261244, 088-261245  
Fax: 088-253740

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm

Saturday & Sunday : 8.00 am – 1.00 pm

Public Holiday : Closed

\*Closed on 12 public holidays

### Keningau



Lot 8, Tang Yiu Loong Shopping Complex,  
89000 Keningau, Sabah  
Tel: 088-7331261  
Fax: 088-7331262

\*Closed on 12 public holidays and 52 sundays

Dispatch HP : 013-8581214

### Sandakan



Block 18, Lots 166 & 167,  
Ground Floor, Phase II, Prima Square,  
Mile 4 Jalan Utara, 90000 Sandakan  
Tel: 089-227658  
Fax: 089-227653

### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm

Saturday : 8.00 am – 1.00 pm

Sunday & Public Holiday : Closed

\*Closed on 12 public holidays and 52 sundays

### Damai KK



Lot No. 29 (DBKK Shop No. 30-1), Lorong Pokok Kayu Manis 1.  
No. 010512759 District of Kota Kinabalu,  
Block C, Damai Plaza Phase 1,  
Jalan Damai, 88300 Kota Kinabalu  
Tel: 088-252421

### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm

Saturday : 8.00 am – 1.00 pm

Sunday & Public Holiday : Closed

\*Closed on 12 public holidays and 52 sundays

\*Closed on 12 public holidays and 52 sundays

### Tawau



TB585, Ground Floor, Lot 45,  
Tacoln Commercial Complex,  
Jalan Haji Karim 91000 Tawau, Sabah  
Tel: 089-757090, 089-757092  
Fax: 089-757091

### Operation Time :

Monday to Friday : 7.30 am – 5.00 pm

Saturday : 8.00 am – 1.00 pm

Sunday & Public Holiday : Closed

\*Closed on 12 public holidays and 52 sundays

### Lahad Datu



No. 97, Kampung Muhibbah, Peringkat 3,  
Jalan Silam, 91100 Lahad Datu, Sabah  
Tel: 014-8737383  
\*Closed on 12 public holidays and 52 sundays

### Labuan



3rd Floor, U 0139, Jalan Bunga Mawar,  
87000 Wilayah Persekutuan Labuan  
Tel: 087-440118  
Fax: 087-440118

### Operation Time :

Monday to Friday : 8.00 am – 5.00 pm

Saturday : 8.00 am – 1.00 pm

Sunday & Public Holiday : Closed

\*Closed on 12 public holidays and 52 sundays



# CONTACT INFORMATION

## Contact Details

### **Glenmarie, Shah Alam (Operational Headquarter)**

*Lot 2, Jalan Pendaftar U1/54, Section U1, Temasya @ Glenmarie, 40150 Shah Alam, Selangor, Malaysia.*

*Tel: 03-55699996, 03-55696826, 03-55690936*

*Fax: 03-55696829, 03-56352855, 03-55696827*

#### Operation Time:

Monday- Friday : 7am-5pm

Consultation hours : 8.00 am - 5.00 pm

Saturday, Sunday & Public Holiday : 7.30 am - 1.00 pm

**Tel: 1-800-88-7171**

**Email: [online@bphealthcare.com](mailto:online@bphealthcare.com)**

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/LISCOM). The telephone numbers have been given for each branch in the list of branches above
2. Get feedback forms which are available in all the diagnostic centers.
3. Feedback can also be done online in our website <http://bphealthcare.com/new/contact-us/feedback/>
4. If in particular when the laboratory process has not been effective in resolving your concern, you can report your concerns to JCI via email at [jciaccreditation@jcrinc.com](mailto:jciaccreditation@jcrinc.com).

Verbal complaints may be also given to the staff at the counter in all the branches, Diagnostic or Specialist centers which will be recorded in the Complaint investigation Form FR03-QA05c.

Acknowledgment and the complaint number will be given immediately

For all the other modes of feedback, acknowledgement will be done within 48 hours (either verbally through a telephone call or email)

All complaints will be investigated and a written reply will be given to the complainant as soon as the investigation is over. If the complainant requires further clarification, to be provided in writing or face to face meeting, a meeting will be arranged with the relevant parties to help resolve the matter and give closure to the complaint.

# **SECTION I:** Policies, Guidelines, Sample Collection, Packaging and Transportation, and Special Procedures

# GENERAL POLICIES

## GENERAL REQUIREMENTS

Proper patient preparation; timing of sample collection; selection of sample container type including preservatives and anticoagulants; sample transportation; and relevant patient clinical data are critical for successful testing, timely reporting of laboratory results, and proper diagnosis.

## TEST REQUEST

### Routine Test Request

All test requests for laboratory tests should be made by a registered medical practitioner using the BP Clinical Lab Sdn Bhd: **Pathology Request Form (FR3-0P01b) (Appendix A)**

### STAT or URGENT Test Request

If the laboratory test result is required urgently for patient(s)' management, please write in red using bold letter "**URGENT**" on the request form and call the laboratory for informing us and urgent pick-up.

The laboratory will notify the doctor immediately once the results are ready, followed by fax or email as per request.

### Add-On Test

We discourage additional tests to be requested on sample drawn earlier due to sample degradation because of storage changes and sample integrity which can affect test results.

However, if you need to add on a test after the sample has been collect by the laboratory, please call the respective diagnostic center/main laboratory in Glenmarie or Ipoh to check if the sample is still available and suitable for performing the additional test request.

### Test sent to Referral Laboratory

The list of referral test is included in the Esoteric List. For more detail information on specimen requirement and Turnaround time, please refer to web link : <http://bphealthcare.com/new/esoteric-list/>

# PATIENT PREPARATION AND INFORMATION

## Patient Preparation

Patient should be instructed about particular requirements of fasting, special dietary consumption, or other requirements before collection. If the test requires self-collection, for example the 24-hours urine collection, please provide the specific instruction pamphlet to the patient.

## Patient Identification

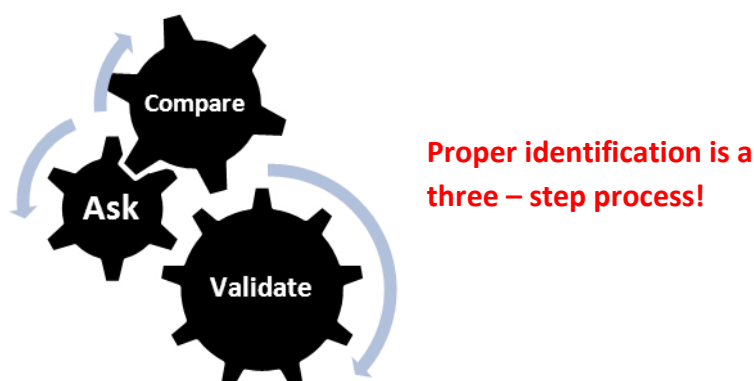
*“Correct identification is essential for patient safety “*

Each patient must be identified positively, using active communication techniques by means of **two patient identifiers** (patient's name/Identification number (I.C. No)/Passport number) before collecting a sample for clinical testing.

In an in-patient setting, the patient's room number or physical location should **NOT** be used as an identifier. The patient's name and hospital ID number may be used as the two identifiers.

The patient's identity should be verified by asking the patient to identify him or herself, prior to collecting the samples.

The identifying label must be attached to the sample container(s) **at the time** of collection. The containers used for laboratory samples should be labeled with the identifiers in the presence of the patient.



## Patient's Informed Consent

Please provide clear explanation to the patients about the laboratory tests and how they will be collected. Where necessary, such as HIV testing, please obtain written informed consent.

# LABORATORY REQUEST FORM

The test request must be made in BP Clinical Lab Sdn Bhd: **Pathology Request Form (FR3-0P01b) (refer Appendix A).**

## Mandatory Information Needed on All Patient Requisitions

### Patient's name

Please write the patient's name clearly and legibly. Correct spelling of patient's name and provision of other relevant bio-data are essential to ensure that the sample collected and received by the laboratory come from the correct patient.

### Patient's NRIC Number or Passport Number

The NRIC (National Registration Identity Card) number is often used as one of the two patient's identifiers.

### Date and Time of Sample Collection

The exact date and time of sample collection should be indicated to enable monitoring of sample integrity. The laboratory will counter check the availability at the time of reception. This information is critical for proper evaluation of the results, especially for test results affected by diurnal differences, such as some of hormonal tests.

### Nature of Sample

Identify sample source by indicating the specific body site from which the sample had been taken.

### Name and Details of Ordering Doctor

Details of the requesting doctor (i.e. name, address, telephone and fax number of the organization, and e-mail address) should be included in the requesting form. The requesting doctor must sign the requesting form. This is to facilitate communication of test results, including notification of critical laboratory results, urgent test results or further discussion of the case (if needed). The use of pre-signed forms is strongly discouraged.

### Clinical History, Age and Gender

This information is useful in assisting the laboratory to interpret test results, where the appropriate reference ranges can be included in the patient's laboratory reports.

Please include the clinical diagnosis, suspected disease/organism, brief clinical history, name, date and duration of treatment given, previous test results with dates and previous laboratory numbers, patient's immune status (e.g. any underlying diseases, cancer chemotherapy, immunosuppressive treatment), and any other relevant patient or clinical data in the special instruction section of the requesting form. These information are useful in assisting the laboratory staff interpret the results.

Clinical history is essential for laboratory interpretation of Histopathology, Cytology, Cytogenetic and Virology tests' results.

**For Microbiology Tests, the following additional information is required:**

- \* Body site and sample type
- \* Antimicrobial treatment history
- \* Date of onset of illness

**Test Request**

Indicate the test required by ticking the appropriate boxes on the request form. Ambiguous tick in between the boxes is not acceptable.

\*\* When making test requests, please ensure that the tests listed as a group are not ordered again as single tests.

To order tests that are not listed on the form, please write clearly the name of the tests in the space marked "Additional Test (Please specify)".

**SAMPLE LABELS**

Label all sample containers prior to collection at the patient's side. Together, we can instill the right culture to ensure the right specimen is collected from the right patient and the right order of test being filled in the request form.

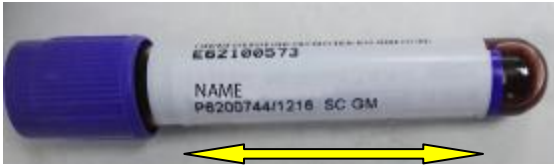



The following information is mandatory

- Patient's name
- Patient ID (NRIC or Passport No.)
- Date & Time of collection
- Source of sample (where relevant)

Please stick the label **lengthwise**.

Unlabeled samples will be **rejected**.



<p><b>Correct way of label</b> 😊</p> 	<p><b>Incorrect way of label</b> ☹️</p> 
<p><b>Correct way of label</b> 😊</p> 	<p><b>Incorrect way of label</b> ☹️</p> 

## SAMPLE COLLECTION

Please note that the sample collection process is dependent on test required and the accuracy and timeliness of test results begin with a successful sample collection.

1. Determine the **type of tests to be ordered and the accompanying instructions** for sample collection (e.g. fasting, non-fasting, pre- or post-medication, pre- or post-dialysis). Determine the time of last medication/meal (if required).
2. Identify the **correct containers/tube types** to be used with the correct additives (if required). Please refer to the **Testing Listing (Appendix B)** for the appropriate container. Samples must be collected into appropriate containers supplied by or approved by BP Clinical Laboratory.
3. Please **check containers** for any defects **before use**.
4. **Aseptic techniques** must be employed during sample collection to prevent the introduction of micro-organisms into the patient's anatomical space, and to prevent the sample from being contaminated.

5. Collect **sufficient amount** of sample to enable the test(s) to be carried out, especially when multiple tests are ordered. In the case the amount of sample is insufficient please state which tests should be done in order of priority.
6. Please **check the containers again after sample collection** for any leakage and **tighten the lids** of containers properly to prevent leakage of samples during handling and transportation. A leaked sample container can pose infection hazards to the transportation and laboratory staff, besides risking the sample to be insufficient.
7. Please ensure that the **outer surfaces** of the containers are not contaminated by the patients' samples.
8. Please place the sample container in the **plastic bag** provided. Please insert the **Request Form in the pocket** on the side of the bag and **not** in the sample compartment.
9. All samples should be regarded as potentially infectious and the **standard universal precaution guidelines** should be adhered by all healthcare workers during sample collection and handling.

### Unacceptable Samples (Rejection Criteria)

The following criteria will be used to consider a sample is unacceptable and will be rejected. The Laboratory staff will inform the ordering clinician will be notified.

- Incompletely filled or no sample identify on the request form
- Sample without accompanying request form
- Sample without any label
- Discrepancy in patient's identity between the request form and sample label
- Inappropriate test sample, e.g. wrong use of container/preservative
- Leaking specimen container
- Grossly haemolysed sample
- Sample received with intact needles

## PACKAGING THE SAMPLES

### Primary Package

Clinical/biological samples should be placed in a sealed container, for example a sealed Vacutainer™ or a specimen container. For discipline specific container, please refer to the relevant sections in the specific sample collection.

### Secondary Package

If the sample is liquid, then the sealed primary container should be placed inside a sealed leak proof secondary package such as a sealed plastic bag or another watertight container which would be sufficient to contain all of the liquid content if the primary container breaks.

Please do the following:

- **One bag** per patient
- Insert the paper request form into the bag's side compartment/pouch/pocket
- Do **not** put the request form together with the sample in same pouch
- Do **not** use staples
- **Needles** must be removed from all sample collection devices before transporting. Samples received with intact needles will be rejected



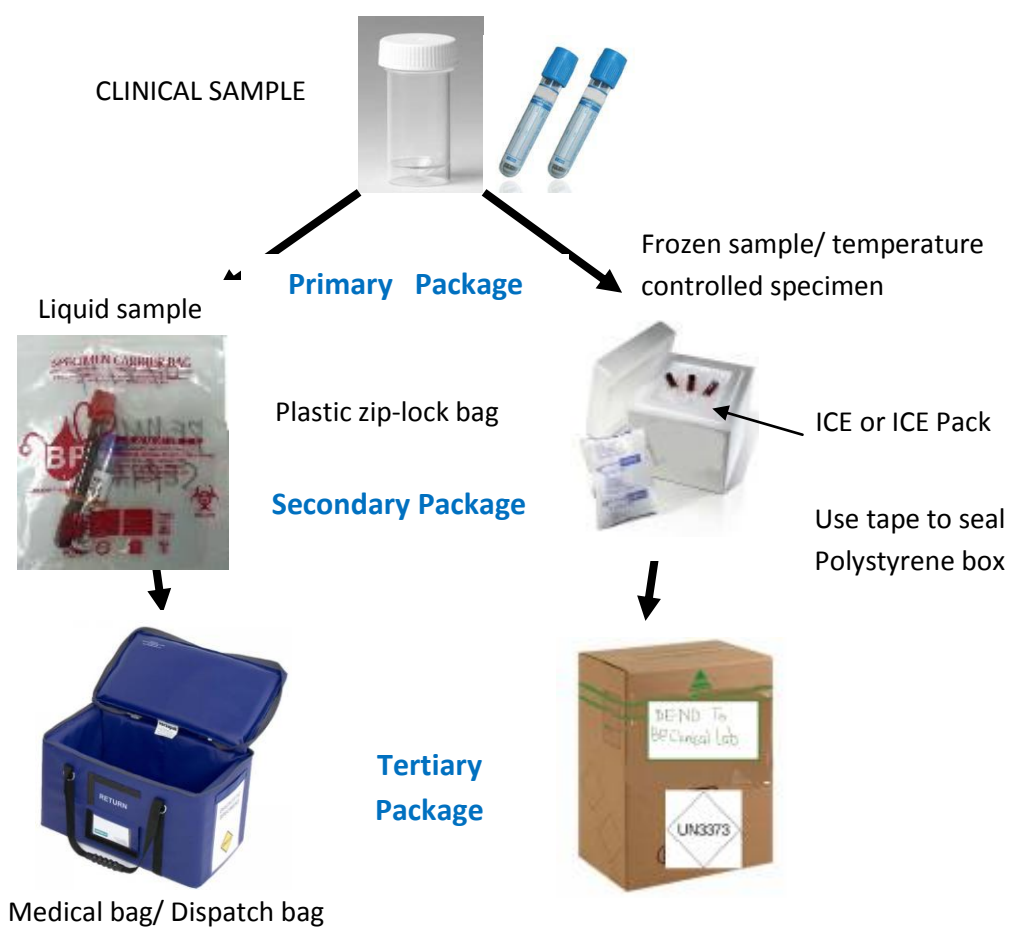
## Tertiary Package

A rigid sealed/secured outer container e.g. a cardboard box or plastic container, to house the secondary package. Please label the laboratory address clearly.

## Special Requirement for Frozen Samples

- ❖ For temperature sensitive samples the secondary container may also be a polystyrene box containing wet/dry ice. The box should be sealed with tape
- ❖ The polystyrene box is then placed inside a tertiary package with proper labeling

## SUMMARY OF PACKAGING FOR CLINICAL / BIOLOGICAL SAMPLE TRANSPORT



## SAMPLE STORAGE

While waiting for the pick-up services arrive, please keep all samples collected within the recommended temperature, as indicated in the specific sample procedure and List of Tests in Section II.

## SAMPLE TRANSPORTATION TO LABORATORY

- All samples should be sent to the laboratory **as soon as possible**
- All samples will be **picked up** from the clinics via the morning and evening pre-determined schedules
- Sample pick-ups for **urgent test request** can be arranged with B.P. Clinical Lab Sdn. Bhd. at respective outlet laboratories
- Please do not send samples that are **not urgent** during non-office hours

### Transportation of Samples within the Same Building

Please follow instruction as for Primary Package and Secondary Package.

### Transport of Samples to Other Areas Not Within the Same Building

Samples should be packaged as per instruction as Primary, Secondary and Tertiary

## COMMUNICATION WITH THE LABORATORY

For information regarding laboratory results, specimen collection or Inquiry , please call our laboratory or Customer Service Centre as below:

Direct Line Glenmarie	<b>+603- 5569 6826 +603- 5569 6001 (new) +603- 5569 6002 (new)</b> Monday – Friday : 0800 – 2359 Saturday, Sunday and Public Holiday : 0800 – 1300
Ipoh	<b>+605-255 9090, +605-241 8484</b> Monday to Friday: 0600 – 1800 Saturday, Sunday: 0600 – 1300 Public Holiday: 0700 – 1300
Customer Service Centre <b>(An alternative line when the Direct Line could not be reached)</b>	
Hotline	<b>1-800-88-7171</b> and select option 3 for Lab Department, followed by option 1 if you are a doctor or from a Clinic
Operational Headquarters	<b>+603-5569 9996</b> and select option 3 for Lab Department, followed by option 1 if you are a doctor or from a Clinic

## TURNAROUND TIME

### Routine Tests

These tests are performed daily and most of the results will be ready **within 24 hours** after receipt of sample in the laboratory.

### STAT/URGENT Tests

A STAT test or an URGENT test request will be given priority over all requests and performed as soon as possible upon receipt. These test results are required urgently for immediate patient management. The turnaround time is **2 hours** and the staff in the laboratory will inform the doctor once the results are ready.

The following are the Tests available on a STAT basis:

- ABO + Rh Grouping
- ESR
- Full Blood Count
- Hb
- PCV
- Platelet Count
- TWBC
- TWDC
- Urine Microscopy
- Urine Feme
- Beta HCG
- Dengue Fever Studies
- Dengue Fever Studies-NS1
- Febrile Studies

### Histopathology

The TAT is generally **three working days** for routine histopathology if the specimen is received at the laboratory before 5.00pm. However, this may be delayed in the following circumstances:

- 1) Calcified or ossified tissues (usually delayed by two working days)
- 2) Tissues received at laboratory inadequately fixed (usually delayed by one day)
- 3) Large complex specimen requiring repeat gross examinations and additional blocks to be taken (usually delayed by one day)
- 4) Any specimen requiring additional special staining e.g. demonstration of infectious organisms, special stains or immuno-peroxidase stains
- 5) Any specimen with difficult or unusual findings requiring further study, inter-pathologist discussion, clinico-pathological correlation with the clinician or telepathology consultation
- 6) Specialized biopsies

**Urgent** histopathology cases can be reported by the **end of the second working day** if the specimen is small and could reach the regional laboratory by 5.00pm of the first day.

## Cytology

**Gynaecological PAP smears** usually require **three working days**. These smears are initially screened by our PAP screener. The TAT may be longer in cases with suspicious or positive cytological findings, cases randomly selected for quality control re-screen by our pathologists, and those for digital imaging processing.

**Non-gynaecological cytological specimen** usually require **two working days**. Cases with difficult cytological features may require a longer TAT.

## Non-routine Tests

These tests are performed according to a specified schedule. Turnaround time to issuance of results is usually **within a week**. The following is the non-routine test schedule in BP Clinical Lab (Glenmarie), updated on 7/10/2016.

For updated information on non-routine test, please refer to the web link :

<http://bphealthcare.com/new/non-routine-test/>

Test Code	Test Description	Sample Requirement	Schedule	Dept
1244	25-HydroxyVitamin D	5ml Plain Blood/Serum	Wednesday and Sunday only	Immunology
A007, A008, A009	Allergy Basic, Standard and Food Profiles	5 ml Plain Blood/Serum	Batch run (TAT 1 week)	Immunology
3105	Anti-Cardiolipin Ab (Phospholipid Ab)	3 ml Plain Blood/Serum	Tuesday only	Serology
3107	Anti-ds DNA*	3 ml Plain Blood/Serum	Tuesday only	Serology
3112	Anti-Nuclear Factor (ANF) - ELISA Method*	3 ml Plain Blood/Serum	Tuesday and Friday only	Serology
1110	Apolipoprotein A1/B	3 ml Plain Blood/Serum (Fasting)	Sunday only	Biochemistry
1246	Beta-2-Microglobulin	3 ml Plain Blood/Serum	Tuesday only	Biochemistry
3121	Chlamydia IgG*	3 ml Plain Blood/Serum	Wednesday and Sunday only	Serology
3123	Complement 3 (C3)	3 ml Fresh Plain Blood/Serum	Friday only	Biochemistry
3124	Complement 3 (C3)	3 ml Fresh Plain Blood/Serum	Friday only	Biochemistry
1116	C-Peptide	3 ml Plain Blood/Serum (Fasting)	Thursday only	Immunology
3125	Cytomegalovirus (CMV) IgG Ab*	3 ml Plain Blood/Serum	Thursday only	Serology
3126	Cytomegalovirus (CMV) IgG Ab*	3 ml Plain Blood/Serum	Thursday only	Serology
7008	Dehydroepiandrosteronesulfate (DHEA-S)	3 ml Plain Blood/Serum	Thursday only	Immunology
3135	Epstein-Barr Virus, VCA IgA Ab*	3 ml Plain Blood/Serum	Tuesday - Saturday, Sun	Serology
8113	Estriol (E3)	3 ml Plain Blood/Serum	Monday only	Immunology
1130	Folic Acid (Folate)	3 ml Plain Blood/Serum	Wednesday & Sunday	Immunology
7029	Free Testosterone (calculated) (include Testosterone,SHBG,Albumin)	5 ml Plain Blood/Serum	Thursday only	Immunology

3235	Hep B Virus DNA viral load (Quantitative, Real-time PCR)	3 ml Plain Blood/Serum	Tuesday only	Molecular Testing
3156	Herpes simplex I IgG Ab (HSV I IgG)*	3 ml Plain Blood/Serum	Monday & Friday only	Serology
3202	Herpes simplex I IgM Ab (HSV I IgM)*	3 ml Plain Blood/Serum	Thursday only	Serology
3157	Herpes simplex II IgG Ab (HSV II IgG)*	3 ml Plain Blood/Serum	Monday & Friday only	Serology
3158	Herpes simplex II IgM Ab (HSV II IgM)*	3 ml Plain Blood/Serum	Thursday only	Serology
3217	Human Papilloma Virus DNA , (High Risk Screen & Genotyping)	Cervical specimen in Liquid cytology, Pap Test solution	Thursday only	Molecular Testing
3211	Immunoglobulin E (Total IgE)	3 ml Plain Blood/Serum	Batch run (TAT 3 days)	Immunology
7017	Insulin	3 ml Plain Blood/Serum (Fasting)	Thursday only	Immunology
7030	Insulin Like Growth Factor 1 (IGF-1)	3 ml Plain Blood/Serum (Fasting)	Monday only	Immunology
3168	Measles IgG Ab (Rubeola IgG)*	3 ml Plain Blood/Serum	Thursday only	Immunology
3178	PSA Total, Free PSA & Ratio	3 ml Plain Blood/Serum	Sunday only	Immunology
3210	Sex Hormone Binding Globulin (SHBG)	3 ml Plain Blood/Serum	Thursday only	Immunology
3185	Toxoplasma IgG Ab*	3 ml Plain Blood/Serum	Thursday only	Serology
3186	Toxoplasma IgM Ab*	3 ml Plain Blood/Serum	Thursday only	Serology
3195	Varicella-Zoster(Herpes Zoster) IgG Ab*	3 ml Plain Blood/Serum	Thursday only	Immunology
1164	Vitamin B12	3 ml Plain Blood/Serum	Wednesday & Sunday	Immunology
3237	HbsAg Confirmatory Test (Qualitative)	3 ml Plain Blood/Serum	Monday & Friday only	Immunology

Note: Above TAT apply to any profile test code which consist of above single test code  
 [\*]: Specimen received after the batch test started on the same day (morning) or after the schedule date will be proceed on the next batch.  
 [\*]: If result required repeat/ verification, test will schedule on the next batch.

## HANDLING OF TEST RESULTS

- All test results are treated with strict confidentiality.
- Laboratory management is responsible for ensuring that reports are received by the appropriate individuals within an agreed-upon time interval. When results transmitted as an interim report, the final report will be forwarded to the requester.
- The total turnaround time (i.e. from the time the specimen is requested till the report is available to the requestor) is monitored for urgent test requests by the laboratory.
- All shortfalls in the turnaround time are investigated and where necessary, corrective action are taken immediately to address any problems.
- Copies or files of reported results are retained electronically in the Laboratory Information System. This facilitates retrieval of the information.
- The laboratory will notify the physician (or other clinical personnel responsible for patient care) when the test results for critical properties fall within established “alert” or “critical” interval and when an urgent test is requested.

## CRITICAL LABORATORY VALUES

### Definition:

**Critical laboratory Result** Test result or value that falls outside the 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

**Critical Limit** Boundaries of low and high laboratory test values beyond which may cause imminent danger to the patient and/or require immediate medical attention

### Who Do We Inform?

To the clinician who had ordered the test or to the next designated person if the responsible clinician is not around.

### How are the Critical Values Identified?

The values are adapted and modified from a study done in Ministry of Health hospitals (2004-2009) and feedback from 611 clinicians from various specialization (*Lily et al: Improving Notification of critical results in MOH Hospitals-Delphi Survey Report 2009*)

### Critical Values for Biochemistry Tests

Values for Adults			Values for Paediatric		
Lower Critical Limit	Analytes	Upper Critical Limits	Lower Critical Limit	Analytes	Upper Critical Limits
2.8 mmol/L	Potassium	6.0 mmol/L	2.8 mmol/L	Potassium	6.0 mmol/L
125 mmol/L	Sodium	155 mmol/L	125 mmol/L	Sodium	155 mmol/L
50 mg/dL	Glucose	360 mg/dL	28 mg/dL	CSF-Glucose	-
6.0 mg/dL	Calcium	12.0 mg/dL	6.8 mg/dL	Calcium	12.4 mg/dL
0.99 mg/dL	Magnesium	4.86 mg/dL	1.21 mg/dL	Magnesium	4.37 mg/dL
1.0 mg/dL	Phosphate	8.8 mg/dL	1.2 mg/dL	Phosphate	8.6 mg/dL
-	Urea	200 mg/dL	-	Urea	53 mg/dL
-	Creatinine	7.4 mg/dL	-	Creatinine	4.3 mg/dL
-	Triglycerides	500 mg/dL	-	-	-
-	-	-	-	Bilirubin	Neonate 30.0 mg/dL Children 25 mg/dL
-	Creatinine kinase	≥10,000 U/L	-	-	-
-	-	-	-	Uric Acid	8 mg/dL
-	Amylase	500 U/L	-	-	-
250 mmol/kg	Serum Osmolality	350 mmol/kg	250 mmol/kg	Serum Osmolality	310 mmol/kg

-	Lithium	1.5 mmol/L	-	-	-
---	---------	------------	---	---	---

### Critical Values for Hematology Tests

Values for Adults			Values for Paediatric		
Lower Critical Limit	Analytes	Upper Critical Limits	Lower Critical Limit	Analytes	Upper Critical Limits
7.0 g/dL	Haemoglobin	19.0 g/dL	7.0 g/dL	Haemoglobin	20.0 g/dL
			8.0 g/dL	Haemoglobin (Neonate)	22.0 g/dL
20%	Hematocrit	60%	20%	Hematocrit	40%
			25%	Hematocrit (Neonate)	70%
50 X 10 <sup>3</sup> /μL	Platelet	1000 X 10 <sup>3</sup> /μL	50 X 10 <sup>3</sup> /μL	Platelet	1000 X 10 <sup>3</sup> /μL
1,000 /cmm	TWCC	50,000 /cmm	-	-	-
1.5 M/cmm	TRCC	6.5 M/cmm	-	-	-
8 Seconds	PT	20 Seconds	-	-	-
-	APTT	50 Seconds	-	-	-
100 mg/dL	Fibrinogen	-	70 mg/dL	Fibrinogen	-

### 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 parasite on blood film
Stool Culture	Salmonella typhi, vibro 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
---	---



# **WHO GUIDELINES ON DRAWING BLOOD: BEST PRACTICES IN PHLEBOTOMY**

## **WHO GUIDELINES ON DRAWING BLOOD: BEST PRACTICES IN PHLEBOTOMY**

# WHO GUIDELINES ON DRAWING BLOOD: BEST PRACTICES IN PHLEBOTOMY

## Purpose and scope

The following guidelines summarize the best practices in phlebotomy to improve the outcomes for health workers and patients, for all levels of health care where phlebotomy is practiced. They extend the scope of the existing guidelines from the World Health Organization (WHO) and the Safe Injection Global Network (SIGN), which is a WHO-hosted network.

## Objective

The objectives of these guidelines are:

- To improve knowledge and awareness of the risks associated with phlebotomy among all health workers involved in the practice;
- To increase safe practices and reduce blood borne virus exposure and transmission;
- To improve patient confidence and comfort;
- To improve the quality of laboratory tests.

## Infection Prevention and Controls:

At all times, follow the strategies for infection prevention and control as listed below:-

DO	DO NOT
DO carry out hand hygiene (use soap & water or alcohol rub), & wash carefully, including wrists & spaces between the fingers for at least 30 seconds (Please note the WHO's 'My 5 moments for hand hygiene')	DO NOT forget to clean your hands
DO use one pair of non-sterile gloves per procedure or per patient	DO NOT use the same pair of gloves for more than one patient DO NOT wash gloves for reuse
DO use a single-use device for blood sampling & Drawing	DO NOT use a syringe, needle or lancet for more than one patient
DO disinfect the skin at the venipuncture site	DO NOT touch the puncture site after disinfecting it
DO discard the used device (a needle and syringe is a single unit) immediately into a robust sharps container	DO NOT leave an unprotected needle lying outside the sharps container
Where recapping of a needle is unavoidable, DO use the one-hand scoop technique	DO NOT recap a needle using both hands
DO seal the sharps container with a tamper-proof lid	DO NOT overfill or decant a sharps container
DO place laboratory sample tubes in a sturdy rack before injecting into the rubber stopper	DO NOT inject into a laboratory tube while holding it with the other hand
DO immediately report any incident or accident linked to a needle or sharp injury, and seek assistance; start PEP as soon as possible, following protocols	DO NOT delay PEP after exposure to potentially contaminated material; beyond 72 hours, PEP is NOT effective






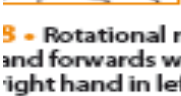



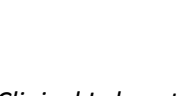
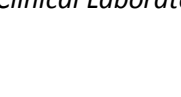
PEP, post-exposure prophylaxis; WHO, World Health Organization.

At <http://www.who.int/gpsc/5may/background/5moments/en/index.html>

## Wash Yours Before Venipuncture









### HOW TO HANDWASH?

• Wash hands only when visibly soiled!

-  1 • Wet hands with water
-  2 • Apply enough soap to cover all hand surfaces.
-  3 • Rub hands palm to palm.
-  4 • Right palm over left dorsum with interlaced fingers and vice versa,
-  5 • Palm to palm with fingers interlaced,
-  6 • Backs of fingers to opposing palms with fingers interlocked,
-  7 • Rotational rubbing, of left thumb clasped in right palm and vice versa
-  8 • Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa
-  9 • Rinse hands with water
-  10 • Dry thoroughly with a single use towel
-  11 • Use towel to turn off faucet
- 12 • Your hands are safe.

### HOW TO HANDRUB?

• Otherwise, use handrub!

-  1 • Apply a palmful of the product in a cupped hand and cover all surfaces.
-  2 • Rub hands palm to palm;
-  3 • Right palm over left dorsum with interlaced fingers and vice versa;
-  4 • Palm to palm with fingers interlaced;
-  5 • Backs of fingers to opposing palms with fingers interlocked;
-  6 • Rotational rubbing of left thumb clasped in right palm and vice versa;
-  7 • Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.
-  8 • Once dry... your hands are safe.

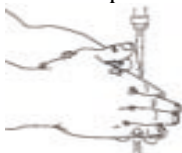
# Practical Guidance on Venipuncture for Laboratory Testing

(WHO guidelines on drawing blood: Best practices in phlebotomy)



1.

1. Assemble equipment to include needle and syringe or vacuum tube, depending on which is to be used



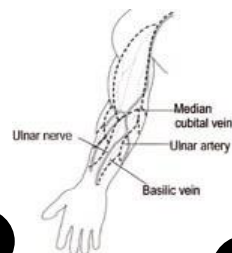
2.

2. Perform hand hygiene



3.

3. Identify and prepare the patient. Ask the patient to state his full name.



4

4. Select the site (preferably at the bend of the elbow). Palpate the area; locate a vein of a good size that is visible, straight and clear. The vein should be visible without applying the tourniquet



5

5. Apply a tourniquet 4–5 finger widths above the selected site



6.

6. Ask the patient to form a fist so that the veins are more prominent



7.

7. Put on well fitting, non-sterile gloves



8

8. Disinfect the site. Use 70% isopropyl alcohol and allow to dry. **DO NOT touch the site once disinfected.**



9

9. Anchor the vein by holding the patient's arm and placing a thumb **BELOW** the venipuncture site. **DO NOT** touch the cleaned site; in particular, **DO NOT** place a finger over the vein to guide the needle



10

10. Perform venipuncture. Enter the vein swiftly at a 30 degree angle



11

11. Once sufficient blood has been collected, release the tourniquet **BEFORE** withdrawing the needle



13

12. Withdraw the needle gently. Give the patient a clean gauze or dry cotton-wool ball to press gently on the site. Ask the patient **NOT to bend the arm**



1.

13. Discard the used needle and syringe or blood-sampling device immediately into the sharps container




15


14. Check the label and forms for accuracy


## Filling tubes


1. If the tube does not have a rubber stopper, press the plunger in slowly to reduce haemolysis (This is safer than removing the needle).
2. Place the stopper in the tube.
3. Following laboratory instructions, invert the sample gently to mix the additives with the blood before dispatch.


## Practical Guidance on Pediatric and Neonatal Blood Sampling (WHO guidelines on drawing blood: Best practices in phlebotomy)


- 


1. Collect supplies and equipment. Use a winged steel needle
- 


2. Perform hand hygiene
- 


3. Immobilize the baby or child
- 


4. Apply a tourniquet
- 


5. Put on well-fitting, non-sterile gloves
- 


6. Attach the end of a winged infusion set to the end of the vacuum tube
- 


7. Remove the plastic sleeve from the end of the butterfly
- 


8. Disinfect the collection site
- 


9. Use a thumb to draw the skin tight and insert the needle
- 


10. Push the vacuum tube completely onto the needle
- 

11. Blood should begin to flow into the tube. Fill the tube until it is full or until the vacuum is exhausted
- 

12. Release the tourniquet
- 

13. Place dry gauze over the venipuncture site and slowly withdraw the needle
- 

14. Ask the parent to continue applying mild pressure
- 

15. Remove the butterfly from the vacuum tube holder. Dispose of the butterfly in a sharps container
- 

16. Label the tube with the patient identification number and date



## BLOOD SAMPLE COLLECTION

### Blood Sample

Most laboratory tests are performed on anti-coagulated whole blood, plasma or serum.

### Whole Blood

Draw sufficient blood into appropriate tube. Invert the tube **gently**, 6 to 8 times immediately after collection. Please **do not** vigorously shake the tube for it will cause haemolysis. Send sample to the laboratory as soon as possible.

### Plasma

Draw sufficient blood into appropriate tube. Invert the tube **gently**, 6 to 8 times immediately after collection. Send sample to the laboratory as soon as possible. If required, separate the plasma from the clot within 20-30 minutes, by centrifuging.

### Serum

Draw sufficient blood into appropriate tube. Allow blood to clot at room temperature. Send sample to the laboratory immediately. If required, separate serum from the clot within 20-30 minutes, by centrifuging.

### Vacuum Tube System Reminders

1. Tubes with **powdered anticoagulants** should be **tapped near the stopper** to dislodge any anticoagulant that may be between the stopper and the tube wall.
2. All tubes with liquid anticoagulants should be **filled to the exhaustion** of the vacuum to ensure proper ratio of anticoagulant to blood.

### Order-Of-Draw Guidelines

The following order-of-draw is recommended when drawing multiple samples for clinical laboratory testing during a single venipuncture. Its purpose is to avoid possible test result error due to cross contamination from tube additives. This procedure should be followed for both, glass and plastic venous blood collection tubes:

1. Blood culture tube
2. Coagulation tube (e.g. blue closure)
3. Serum tube with or without clot activator, with or without gel (e.g. red closure)
4. Heparin tube with or without gel plasma separator (e.g. green closure)
5. EDTA (e.g. lavender closure)
6. Glycolytic inhibitor (e.g. gray closure)

When using a winged blood collection set for venipuncture and a coagulation tube is the first tube to be drawn, a discard tube should be drawn first. The discard tube must be used to fill the blood collection tubing dead space and to assure maintenance of the proper anticoagulant/blood ratio and need not be completely filled. The discard tube should be a non-additive or a coagulation tube.

*(Reference: CLSI DOCUMENT H3-A5, Procedures for the Collection of Diagnostic Blood Samples by Venipuncture; Approved Standard-5th edition, Vol. 23, No. 32)*



## Order of Draw for Multiple Tube Collections:

Blood should be collected in the RECOMMENDED order based on the test(s) being collected to prevent contamination:-

Order of Draw	Description	Tube Content	Draw Volume	Determinations	Instructions
1		BACTEC Blood Cultures	8-10 mL per bottle	Aerobic & Anaerobic Cultures	Sample for Blood cultures should be done separately. However, if blood samples are also needed, then <b>blood cultures are done first</b> to avoid contamination by additives from other blood tubes
2	 Blue	Sodium Citrate	2.7 mL	PT/PTT PT/INR Platelets Function Test (PFT) (use 7 tubes for PFT)	Allow tube to fill completely. Mix by inverting <b>4</b> times
3	 Red	Plain	6 mL	Antibody identifications (Immuno-haematology)	Mix by inverting <b>5</b> times
4	 Gold	SST (Plain with Gel)	5 mL	For Biochemistry tests (serum determinations)	Mix by inverting <b>5</b> times
5	 Green	Lithium Heparin	4 mL	Ammonia ( <b>please send in with ice-pack</b> ), HLAB27 (use 2 tubes), Cytogenetic investigations	Mix by inverting <b>8</b> times
6	 Pink	K <sub>2</sub> EDTA 10.8 mg	6 mL	Strictly for Group X-Match, Pre-transfusion Tests (Blood Group, Antibody Screen, Compatibility test)	Mix by inverting <b>8</b> times
7	 Lavender	K <sub>2</sub> EDTA 5.4 mg	3 mL	FK506, Cyclosporin, G6PD, FBC, HbA1c, Homocysteine ( <b>please send in with ice-pack</b> )	Mix by inverting <b>8</b> times
8	 Grey	Sodium Fluoride	6 mL	Lactate ( <b>please send in with ice-pack</b> ), Pyruvate, GTT	Mix by inverting <b>8</b> times

CLSI: Clinical Laboratory and Standards Institute.  
Reference: H3-A5 Vol. 23 No. 32 Replaces H3-A4 Vol. 18 No. 7

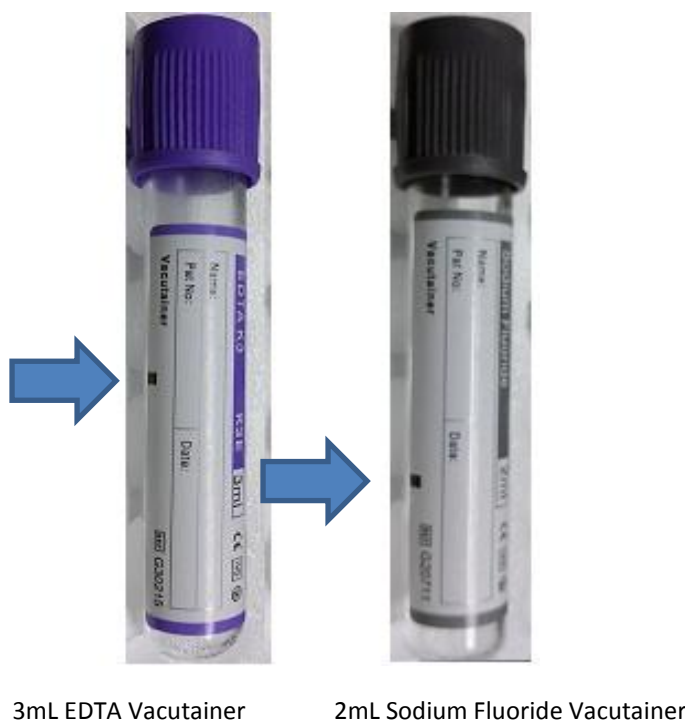


## Blood Collection

- a) It is recommended to take blood from a **seated patient before breakfast** to avoid interference from food, diurnal variation and variations arising from body position (exception for hospital in-patients).
- b) **Venous blood** is used for testing most substances except for blood pH and blood gases measurement (whole arterial blood is heparinized in a tube with minimal head space or syringe in which it was taken).
- c) **Avoid prolonged venous stasis** by releasing the tourniquet soon after the needle enters the vein. Refrain from taking blood from a limb with a running intravenous infusion.
- d) Observe careful technique and gentle handling to prevent haemolysis and trauma to the surrounding tissues.
- e) Collect blood samples in **standard colour-coded vacutainers**. Obtain the tubes from B.P. Clinical Lab Sdn. Bhd. outlet laboratory. Users can requisite for blood tubes using consumables requisition form.
- f) Fill all tubes until the vacuum is exhausted and blood ceases to flow. For accurate results, fill the tubes **to the marked line** to ensure the correct blood anticoagulant ratio is attained and invert the tubes **gently** 6 to 10 times immediately after venipuncture.







Draw sufficient blood

- Fill to the **“BLACK” mark** on the tube



## Description of Vacutainer Blood Collection Tubes

LABPRO tubes are used at B.P. Clinical Lab Sdn. Bhd. The table below gives a summary of the tubes available:

Color Code	Anticoagulant	Available Size	Laboratory Use	Number of inversion
Red 	No anticoagulant	5mL vacutainer 7mL vacutainer	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.  ** Blood clotting time: 60 minutes	5
Blue 	Sodium Citrate	3mL vacutainer	For trace-element, toxicology, and nutritional-chemistry determinations.  Special stopper formulation provides low levels of trace elements	8
Yellow 	No anticoagulant. Contains gel for serum separation.	8mL vacutainer	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.  ** Blood clotting time: 30 minutes.	5
Green 	Sodium Heparin	5mL vacutainer	For plasma determinations in chemistry. Tube inversions ensure mixing of anticoagulant (heparin) with blood to prevent clotting	8
Lavender 	EDTA (K3)	3mL vacutainer	K3EDTA for whole blood hematology determinations.  ***Tube inversions ensure mixing of anticoagulant (EDTA) with blood to prevent clotting	8
Gray 	Sodium Fluoride	2mL vacutainer	For glucose determinations. Sodium fluoride is the antiglycolytic agent.  ***Tube inversions ensure proper mixing of additive with blood.	8

# SPECIMEN REQUIREMENTS FOR OPTIMAL RESULTS

## 1. Contamination and Evaporation

Specimens should be kept in closed tubes

## 2. Prompt Processing

Please inform dispatcher to collect specimens and deliver to the laboratory as soon as possible (**within 2 hours** of collection).

**For longer periods, separate** serum or plasma from contact with cells (non-whole blood) and **keep in the refrigerator** until delivery to the laboratory. If centrifuge is not available, collect serum using a Pasteur pipette and transfer it into a plain container once the clot has retracted.

## 3. Fasting Blood

Draw blood after an overnight fast of 10-12 hours. Take all essential medication with a glass of plain water only. Fasting specimens are required for the following tests:

- Alpha-Fetoprotein (AFP)
- Apolipoprotein A1/B
- B-hCG
- CA 12-5
- CA 15-3
- CA 19-9
- Carcinoembryonic Antigen (CEA)
- C-peptide
- Dehydroepiandrosterone sulfate (DHEA-S)
- Estradiol (E2)
- Ferritin
- Folate/Folic Acid
- Follicle Stimulating Hormone (FSH)
- Free Prostate Specific Antigen (Free PSA)
- Free Thyroxine (FT4)
- Free Triiodothyronine (FT3)
- Gastrin
- Glucose
- Growth Hormone
- Homocysteine
- Insulin
- Insulin-like Growth Factor
- Intact Parathyroid Hormone (iPTH)
- Lipids
- Luteinizing Hormone (LH)
- Parathyroid Hormone, Intact
- Progesterone
- Prolactin
- Sex Hormone Binding Globulin (SHBG)
- Testosterone
- Thyroid Stimulating Hormone (TSH)
- Total Prostate Specific Antigen (Total PSA)
- Total Thyroxine (TT4)
- Total Triiodothyronine (TT3)
- T-Uptake
- Unconjugated Estriol (E3)
- Vitamin B12
- Vitamin D

## 4. Temperature

Specimen (excluding swab and semen) must be stored at **2-8°C** and must reach the laboratory as soon as possible, **within minutes** for blood gas analysis, **2 hours** for coagulation studies and ESR,

The following general rules apply to the storage of serum or plasma:

- At room temperature, no significant changes occur in metabolites, enzymes and electrolytes over a 4 hour period;
- At 2-8°C, metabolites, enzymes and electrolytes are practically unchanged after 24 hours.

Other samples may remain stable over a longer period than the above specified rules.

Specimens are chilled to inhibit the metabolism of blood cells and to stabilize certain thermo labile constituents. **Do not chill whole blood specimens** unless indicated.

**PLEASE CHILL** the specimens for the following analytes immediately in either crushed ice or a mixture of ice and water. Ensure that the coolant covers the specimen level in the tube.

- Adrenocorticoid Hormone (ACTH)
- Parathyroid Hormone, intact
- Gastrin
- Growth Hormone
- 

**Do NOT chill Lactate Dehydrogenase Isoenzymes specimens.**  
**Keep at room temperature.**

## 5. Timing

Please ensure timed specimens are collected for analytes which show **marked diurnal variation**, e.g. ACTH and cortisol. Please ensure that the correct test is ordered, for example, ***Cortisol 8am for specimens taken at 8am.***

## 6. Exposure to Light

Photosensitive analytes may be degraded on exposure to direct sunlight (UV) or artificial light. Protect samples with aluminum foil wrap or equivalent.

All **urine specimens** that require protection from light should be collected in a brown tinted container, placed in a brown paper bag, or wrapped in foil (preferred).

All **serum, plasma, or whole blood specimens** that require protection from light should be placed in a brown paper bag or wrapped in foil (preferred).

The following is a listing of tests that require that the sample be protected from light:

- |                           |                             |
|---------------------------|-----------------------------|
| • Amphotericin B, Serum   | • Chlorpromazine, Serum     |
| • Bilirubin, Fractionated | • Folic Acid, Erythrocytes  |
| • Bilirubin, Total        | • Isoniazid, Serum          |
| • Carotene                | • Lipid Survey, Body Fluids |
| • Chlordiazepoxide, Serum |                             |

- Porphobilinogen(PBG), Quantitative, Urine
- Porphyrins, Qualitative Screen, Urine
- Porphyrins, Quantitative, Urine
- Pyridoxal 5-Phosphate, Plasma
- Rifampin
- Thioridazine
- Trifluoperazine, Serum
- Vitamin A
- Vitamin B1, Plasma or Serum
- Vitamin B1, Whole Blood
- Vitamin B2
- Vitamin B3 (Niacin)
- Vitamin C, Plasma
- Vitamin E
- Vitamin K1

## SPECIMEN ARTEFACTS

Inaccurate blood tests results may be due to the following errors in collection technique, transportation or processing:

Problem	Common Causes	Consequences
Prolonged venous stasis during collection (tourniquet)	<ul style="list-style-type: none"> <li>• Cuff being left up around arm</li> </ul>	<ul style="list-style-type: none"> <li>• High serum Calcium (Ca), Albumin (ALB), Lipids, Protein (TP), Haemoglobin (Hb), Packed Cell Volume (PCV), White Cell Count (WCC), Platelet Count (Plt)</li> <li>• APTT/PT may be shortened</li> </ul>
Delay in separation of serum or plasma	<ul style="list-style-type: none"> <li>• Overnight storage</li> <li>• Delay in transit</li> </ul>	<ul style="list-style-type: none"> <li>• High Potassium, Aspartate Transaminase (AST), Lactate Dehydrogenase (LDH), Magnesium (Mg)</li> <li>• Low Sodium (Na) (occasionally), Glucose (GLU)</li> <li>• Inaccurate coagulation results</li> </ul>
Incorrect container or anticoagulant; inadequate anticoagulant ratio	<ul style="list-style-type: none"> <li>• No enzyme inhibitor</li> <li>• EDTA tube for routine chemistry</li> <li>• Improper mixing of specimen</li> </ul>	<ul style="list-style-type: none"> <li>• Low GLU</li> <li>• High Na, K</li> <li>• Low Ca, Alkaline Phosphatase (Alkp)</li> <li>• Prolonged APTT/PT (EDTA/Heparin)</li> <li>• Low Plt (Heparin)</li> <li>• Artefactual changes in cell morphology, on blood film (too little blood added to anticoagulant)</li> <li>• Low Hb/PCV, WCC, Plt (small clot detected) (too much blood added to anticoagulant)</li> </ul>
Lipaemia	<ul style="list-style-type: none"> <li>• Specimen taken immediately after fatty meals or in patients with hypertriglyceridaemia</li> </ul>	<ul style="list-style-type: none"> <li>• Optical interference with many assays such as Ca, ALB, Phos, Creat, Alkp, AST, Glucose</li> <li>• Falsely low Na</li> <li>• Falsely elevated Hb</li> </ul>

<b>Problem</b>	<b>Common Causes</b>	<b>Consequences</b>
Hyperglobulinaemia	<ul style="list-style-type: none"> <li>• Patients with liver disease</li> </ul>	<ul style="list-style-type: none"> <li>• Low Na, Ca</li> <li>• Elevated Hb</li> </ul>
Contamination of blood by infused fluids	<ul style="list-style-type: none"> <li>• High Molecular Weight dextrans</li> <li>• Dextrose</li> <li>• Crystalloid solutions</li> <li>• Phosphate</li> <li>• Citrate</li> </ul>	<ul style="list-style-type: none"> <li>• Elevated TP, ALB</li> <li>• High GLU, Triglycerides</li> <li>• Spurious Na, K, Chloride (Cl)</li> <li>• Low ionized Ca</li> <li>• High Na</li> <li>• Low Phosphate (Phos), Creatinine (Creat), Alkp, AST</li> <li>• Prolonged APTT/PT (Heparin)</li> <li>• Low Hb/PCV, WCC, Plt</li> </ul>
Photolabile analytes	<ul style="list-style-type: none"> <li>• Specimen not protected with aluminum foil wrap/equivalent</li> </ul>	<ul style="list-style-type: none"> <li>• Low Folate, Vitamin B12, Porphyrins Neonatal Bilirubin, Vitamin A</li> </ul>
Bubbles in blood for arterial gases	<ul style="list-style-type: none"> <li>• Leaking syringe/needle junctions</li> <li>• Inadequate stoppering</li> </ul>	<ul style="list-style-type: none"> <li>• Low PCO<sub>2</sub></li> <li>• Increased PCO<sub>2</sub></li> </ul>
Haemolysis	<ul style="list-style-type: none"> <li>• Blood sample forced through a needle into container/tube</li> <li>• Vigorous mixing of sample</li> <li>• Excessive delay in transit</li> <li>• Sample in hot place</li> <li>• Difficult venipuncture or blood drawn from haematoma</li> <li>• Disease process causing intravascular haemolysis</li> <li>• Ethanol on skin</li> </ul>	<ul style="list-style-type: none"> <li>• High K, Hb, Phosphate (PO<sub>4</sub>)</li> <li>• Low Na, Cl, Thyroxine (T<sub>4</sub>), GLU</li> <li>• High AST, LDH, LDH1, Alanine Transaminase (ALT)</li> <li>• High Mg, Ca, ALB, TP, Iron (Fe)</li> <li>• Interferences in colorimetric assays</li> <li>• Activates clotting factors</li> <li>• Red cell parameters altered in Full Blood Count (FBC)</li> </ul>
Incorrect proportion of anticoagulant to blood (<90% of the expected fill of the	<ul style="list-style-type: none"> <li>• Excess citrate</li> <li>• Excess liquid heparin</li> </ul>	<ul style="list-style-type: none"> <li>• Prolonged PT and APTT</li> <li>• Abnormal Arterial Blood Gases (ABG) and</li> </ul>

Problem	Common Causes	Consequences
vacutainers)	<ul style="list-style-type: none"> <li>• Excess EDTA</li> </ul>	<ul style="list-style-type: none"> <li>diluted analytes</li> <li>• PCV, Cell Count, Cell Morphology affected</li> </ul>
Clots in anticoagulated blood	<ul style="list-style-type: none"> <li>• Difficult venipuncture</li> <li>• Specimens not mixed well</li> </ul>	<ul style="list-style-type: none"> <li>• Shortened PT</li> <li>• Spurious results in FBC, ABG, Cyclosporin, hormones and other assays requiring whole blood specimens</li> </ul>
Specimens not chilled or sent to the laboratory immediately	<ul style="list-style-type: none"> <li>• Delay in transit</li> <li>• No coolant available</li> <li>• Instructions not understood</li> </ul>	<ul style="list-style-type: none"> <li>• Spurious results in Ammonia (NH<sub>3</sub>), Lactate, Pyruvate, ABG, Gastrin, Parathyroid Hormone (iPTH), Adrenocorticotrophic Hormone (ACTH), Renin and complement.</li> <li>• May not identify Chlamydia, amoeba and some microorganisms because of poor viability</li> </ul>

#### ROUTINE URINALYSIS:

- Routine urinalysis should be performed on a fresh specimen.
- Specimens that are **more than two hour** old will usually show signs of deterioration and will be unreliable for testing.
- Specimens collected from the patient should be delivered immediately to the laboratory.
- Samples can be **refrigerated** if there is a delay in delivering to the laboratory.





## **SPECIAL PROCEDURES FOR BIOCHEMISTRY TESTS**

### **24-Hour Urine Collection**

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

#### **Procedure of collection:**

- The 24-hour urine bottle which contains preservative for the required test is available at the collection center and provided on request, with the accompanying request form or note.
- 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.
- Collect the second and subsequent voided urine for 24-hour from the timed start into the 24-hour urine bottle.
- For male patient, it is advisable NOT to void the urine directly into the 24-hour urine bottle. This is to avoid possible chemical burns.
- At the end of 24 hours, the last urine voided is collected. For best result, refrigerate the sample.
- Label the bottle as directed and send immediately to the laboratory.
- Examples of the tests: 24-hours urine cortisol and 24-hours urine catecholamine

### **24-Hour Urine Catecholamines**

- Please refer to the procedure for 24-hour urine collection to collect urine for 24-hour urine catecholamines.
- Please note that, 10 mls of 25% HCl is added into the bottle to preserve the analytes. It is important for the requesting physician to advise the patient **NOT** to discard the preservative.
- Instructions on patient preparation and specimen collection:
  - Abstain from bananas, coffee, pineapple and walnuts one day prior to and during the 24-hour urine collection.
  - Certain drugs alter the metabolism of catecholamines. It is advisable to stop such medications at least days prior to urine sampling. The medications include: Alpha<sub>2</sub> agonists, Calcium channel blockers, ACE inhibitors, Bromocriptine, Methyldopa, Monoamine oxidase inhibitors, Alpha blockers and Beta blockers, Phenothiazines and Tricyclic antidepressants.
  - Please advise patient to avoid stress, exercise, and smoking prior to and during urine collection.

### **Patient Information for 24-hour urine collection**

With any medical test it is important that other factors do not interfere with your test result. Please read and follow these instructions carefully.

- You must use the collection bottle provided BP Diagnostic Center
- **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-hour period.

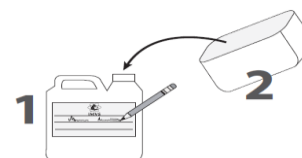


### **Day 1**

- When you get up (e.g. 7:30am) pass urine into the toilet.
- Do **not** collect this 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 wake 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 nearest BP Diagnostic center

### **Your results**

Your doctor will advise you when results are available

## **Lactate**

Collection of a satisfactory specimen for lactate analysis requires special procedure to prevent changes in lactate concentration while and after the specimen is drawn. Please inform the laboratory at least two hours prior to blood collection for the instruments to be calibrated and ready for analysis on receipt of specimen.

### **Procedure of collection:**

- Patient should be fasting and at complete rest.
- A venous specimen is best drawn without a tourniquet or immediately after the tourniquet has been applied briefly.
- If the tourniquet has been applied very long, it should be removed after the puncture has been performed and blood allowed to circulate for at least 2 minutes before the blood is withdrawn.
- Collect 2 mls of blood in a container with fluoride EDTA as anticoagulant (use glucose tube).

**Important notes:**

- Sample should be **chilled in ice water** and sent to the laboratory immediately.
- Separation of cells at the laboratory should be done **within ½ hour**.
- Stability of supernatant plasma: 3 days at 2-8°C (after separation from cells).
- Haemolysis may affect results.

**Ammonia**

Collection of a satisfactory specimen for ammonia analysis requires special procedures to prevent changes in ammonia concentration while and after the specimen is drawn.

**Procedure of collection:**

- A venous specimen is best drawn without a tourniquet or immediately after the tourniquet has been applied briefly.
- If the tourniquet has been applied very long, it should be removed after the puncture has been performed and blood allowed to circulate for at least 2 minutes before the blood is withdrawn.
- Collect 2 ml of blood in a container with EDTA as anticoagulant.

**Important notes:**

- Sample should be **chilled in ice water** and sent to the laboratory immediately.
- Separation of cells at the laboratory should be done **within 15 minutes**.
- Stability of supernatant plasma: 2 hours at 4°C (after separation from cells).
- Assay to be performed immediately.
- Smoking may affect ammonia level.

**SPECIAL PROCEDURES FOR MICROBIOLOGY TEST****General Guidelines for Proper Specimen Collection and Transport**

- Collect specimen before administering antimicrobial agents where possible.
- Use **sterile containers** and **aseptic technique** to collect specimens to prevent introduction of microorganisms during the invasive procedures.
- Collect an **adequate amount** of specimen. Inadequate amounts of specimen may yield false negative results.
- Transport of swabs in suitable media is essential for reliable results.
- Specimens obtained 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 material in the syringe, add some sterile saline, mix and then transfer to a sterile container.
- **Formalin** must not be used to preserve microbiology samples.
- All specimens from **high risk patients** (HIV, Hep B, TB, and others) must be clearly marked as high risk.
- The specimen container must be **properly labeled**, placed in a biohazard plastic bag and accompanied by a completed laboratory request form.
- Specimens should be transported to the laboratory as soon as possible and preferably within 24 hours.

## Special Instructions

### Urine Culture

A clean mid-stream specimen is essential. In urinary tract infection (UTI) the bacterial count exceeds 100,000 organisms/ml in the majority of cases.

Urine acts as a culture medium and therefore specimens should be **stored at 4°C** to prevent subsequent multiplication of bacteria after collection of the patient's sample which would invalidate the bacterial count. **Any sample which may be subject to delay of more than 2 hours before being sent to the lab should be refrigerated.**

Urine for culture should be collected as described below in a sterile 90mL container. The patient's full name, I.C. Number, source of specimen and date and time of collection should be specified on the request form **and** sample container. Also include additional relevant information concerning pregnancy, antibiotic medication, drug allergies, etc. on the requisition.

A **“mid-stream clean catch”** urine sample is necessary for culture so that any bacteria present around the urethra and on the hands do not contaminate the specimen.

### Collection of a Mid-stream Urine Samples

- (a) Early morning urine specimens are preferred, although urine collected at other times of the day are acceptable.
- (b) Use a sterile container for collection.
- (c) Complete the information requested on the container label: full name, IC Number, source of specimen and date and time of collection.
- (d) **Instruction given to the patient:**
  - Wash and dry your hands thoroughly.
  - Remove the container lid and set it aside. Do not touch inner surfaces of 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 un-circumcised), and clean the glans (head of the penis)
  - Pass a small amount of urine into the toilet (a women 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.
  - Replace the lid and tighten firmly.
  - Wash and dry your hands thoroughly.
- (e) **Immediately refrigerate** the specimen and dispatch to the laboratory **within 24 hours** of collection (maintain at **2-8°C** when transporting).
- (f) If transportation to the laboratory is expected to go **beyond 24 hours**, transfer 10mL of urine into an **NCS tube with boric acid preservative**. Maintain preserved urine (NCS tube) at room temperature and submit to the laboratory **within 72 hours** of collection.

## Blood Culture

Ensuring that blood cultures are obtained in a manner that prevents contamination is a cornerstone of an infection prevention and control process. In addition, the increasing use of blood cultures obtained through vascular/arterial devices necessitates meticulous technique and timely communication with the microbiology laboratory.

Blood for cultures	
Collection	<ul style="list-style-type: none"><li>○ Venous blood<ul style="list-style-type: none"><li>▪ infants: 0.5 - 2 ml</li><li>▪ children: 2 - 5 ml</li><li>▪ adults: 5 - 10 ml</li></ul></li><li>○ Requires aseptic technique</li><li>○ Collect within 10 minutes of fever<ul style="list-style-type: none"><li>▪ if suspect bacterial endocarditis: 3 sets of blood culture are required</li></ul></li></ul>

### Timing and Number

**Acute Sepsis:** Collect **two or three** sets of culture from **separately prepared sites** prior to 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, prior to initiating therapy. These cultures are often obtained **30 minutes apart** in order 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.

### Volume of Blood:

The volume of blood is **critical** because the concentration of organisms in most cases of bacteremia is low, especially if the patient is already on antimicrobial therapy. However, in infants and children, the concentration of organisms during bacteremia is higher than in adults, so less volume of blood is required.

**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 prior to obtaining the blood if assistance is needed in determining the correct amount of blood needed for the child/infant.

## Procedure for blood Collection

Blood can be collected by venipuncture of peripheral veins or arteries. Collection from intravascular catheters is not recommended as they are intrinsically contaminated. If a line must be used, indicate the type of line or port through which the blood was obtained.

Technique is important to prevent contamination of the blood resulting in inaccurate results. The following are the basic tips to prevent contamination of blood collection:

- Perform hand hygiene, explain the procedure to the patient prior to collection of all specimen, and adhere to all appropriate safety equipment.
- Locate the venipuncture site prior to skin disinfection.
- Disinfect the venipuncture site and the stoppers of the bottles prior to blood collection.
- Use chlorhexidine/alcohol combination (e.g. ChloraPrep™) for skin disinfection for optimal results.
- Disinfect the top of the blood culture bottle(s) with 70% isopropyl or ethyl alcohol.
- Scrub the site with a chlorhexidine/alcohol swab or wand, using single stroke.
- Allow the disinfectant to dry. (**DO NOT** palpate the vein after disinfecting the skin, prior to inserting the needle).
- Draw blood using a sterile safety syringe and needle, or safety butterfly, designed to attach to a vacutainer holder and dispense the appropriate amount of blood into the bottles.

**NOTE:** The blood culture bottles can be used with the vacutainer adapter, but it may not deliver a controlled draw. Care must be taken to dispense the appropriate amount of blood into the culture bottle.

- After venipuncture and inoculation of bottles, engage safety device on needle or butterfly and immediately dispose of collection materials in a sharps container. Wipe residual chlorhexidine/alcohol from skin with alcohol to prevent irritation of the skin.
- Indicate site of draw, date and time of draw, and initials of person drawing blood.
- If blood has been obtained through an indwelling intravascular device, provide specific information including lumen and location of the device.
- Transport blood cultures to the Laboratory **immediately**. **Do not** refrigerate. Delay in transport may compromise the specimen and recovery of organisms.

## Nasal Swab

A nasal swab is not usually useful for the investigation of sinusitis. Antral lavage or pus from sinus should be sent if acute maxillary sinusitis is suspected.

Nasal swabs are useful for the investigation of carriage of *Staphylococcus*, including MRSA.

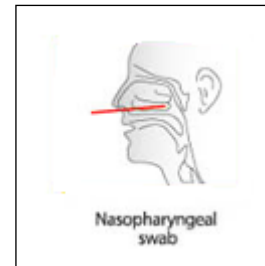


### Use Infection Control Precautions

- Wear a surgical mask and disposable gloves.
- Wash hands thoroughly with soap and water or alcohol-based hand gel before and after the procedure.
- When completed, dispose of all PPE and other contaminated materials in the trash.

### How to Do a Nasopharyngeal Swab

- Remove patient's surgical mask to perform the procedure and replace with a new one when done.
  - Use a flexible fine-shafted aluminum swab with a polyester (dacron or rayon, not cotton or calcium alginate) tip.
  - The distance from the patient's nose to the ear gives an estimate of the distance the swab should be inserted.
  - Insert swab into one nostril down and backward into the nasopharynx and leave in place for a few seconds.
  - Slowly withdraw swab with a rotating motion.
  - Place tip of the swab into a vial containing 2–3 ml of VTM\* and cut the shaft.
- Storage
- Specimen can be kept refrigerated at **4°C for up to 72 hours**
  - Specimens that cannot be processed within 48-72 hours should be kept in the refrigerator at **4°C**.



## Genital Infections Sexually Transmitted Diseases

### Specimens Required

Females: Cervical or High vaginal swabs, Urethral swabs

Males: Urethral swab, penile swab

### Genital tract swabs

Cervical and high vaginal swabs should be taken with the aid of a speculum. It is important to avoid vulvar contamination of the swab. For *trichomonas*, the posterior fornix, including any obvious candida plaques should be swabbed. If pelvic infection, including gonorrhea, is suspected, the cervical os should be swabbed.

### High Vaginal Swabs

After the introduction of the speculum, the swab should be rolled firmly over the surface of the vaginal vault. The swab should then be placed in transport medium preferably with charcoal.

## Cervical Swabs

After introduction of the speculum into the vagina, the swab should be rotated inside the endocervix. The swab should then be placed in transport medium preferably with charcoal.

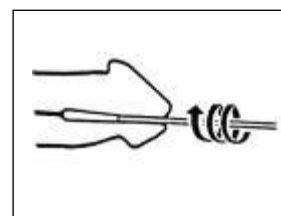
## Urethral Swabs

Contamination with micro-organisms from the vulva or the foreskin should be avoided.

Thin swabs are available for collection of specimens.

The patient should not have passed urine for at least 1 hour.

For males, the swab is gently passed through the urethral meatus and rotated. Place the swab in transport medium preferably with charcoal.



## Intrauterine Contraceptive Devices (IUCDs)

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

## Rectal Swabs

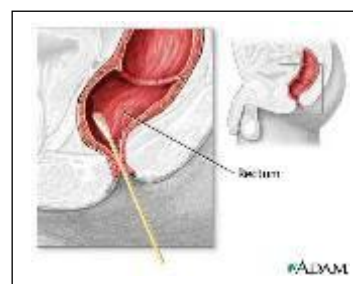
Rectal swabs should be taken via a proctoscope.

### *Advantages of rectal swabs:*

- Convenient
- Adapted to small children, debilitated patients and other situations where voided stool sample not feasible

### *Drawbacks of rectal swabs:*

- No macroscopic assessment possible
- Less material available
- Not recommended for viruses



## Pus Samples/ Wound Swabs

Wound swabs should only be taken when signs of clinical infection are present. Deep rather than superficial swabs give more accurate representation of bacteria/fungi if present.

Please indicate clearly on the request form and the swab, the site of the wound to facilitate interpretation of culture results.

## Specimens Required

1. **Pus** sample (always preferable to a wound or pus swab) in sterile universal container.
2. **Wound swab** in transport medium.



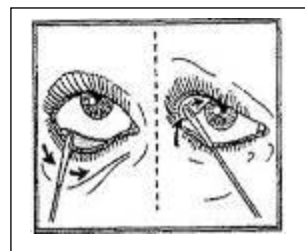
Wound or Pus samples are screened for all likely bacterial pathogens and, if present, these organisms and their antibiotic sensitivity results will be reported. The inclusion of relevant clinical information on the request form will assist in determining the bacterial isolates.

## **Abscess**

1. Decontaminate the surface with 70-95% alcohol and 1-2% tincture of iodine.
2. Collect the purulent material aseptically from an un-drained abscess, using a **sterile needle and syringe**. Open miliary abscesses with a sterile scalpel and collect the expressed material with a sterile needle and syringe.
3. 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.*
4. **Swabs are a poor choice** because they dry easily and because of the limited amount of material obtained. Swabs are not optimal for fungal, anaerobe cultures, or decubitis ulcers. Swabs are **not** accepted for mycobacterial cultures, perirectal abscesses, oral abscesses. Gram stains cannot be provided from a single swab. If a Gram stain is needed, collect two swabs.

## Eye Swab

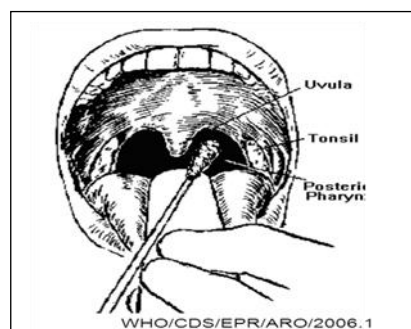
- **Explain** the procedure and the purpose of the investigation to the patient to obtain informed consent, gain co-operation, and allay any fears and anxieties.
- **Sit or lay** the patient with head well-supported and with the chair at an appropriate height to ensure safety for the patient and the nurse.
- Do **hand hygiene** to reduce the risk of cross infection
- Ask the patient to look up and gently pull down the lower lid exposing the conjunctiva.
- Gently sweep the swab stick along the lower fornix, from **inner to outer canthus**, taking care not to touch the eyelids. Place swab immediately into bacterial medium container, then ask patient to close the eye for a few seconds. This will ensure safe technique of swab taking and avoid damage to the cornea.
- Repeat the procedure to the other eye if necessary to comply with investigatory request, **wash hands in between** to minimize the risk of contamination to the other eye. A **separate swab** is required for each eye.



## Throat Swab

(posterior pharyngeal swab)

- Hold tongue away with tongue depressor.
- Locate areas of inflammation and exudate in posterior pharynx, tonsillar region of throat behind Uvula.
- Avoid swabbing soft palate.
- Do not touch tongue.
- Rub the affected area back and forth with cotton or Dacron swab



## BLOOD FILMS FOR PARASITOLOGY

Blood for smears	
<b>Collection</b>	
Capillary blood from finger prick	
• Make smear	
• Fix with methanol or other fixative	
<b>Handling and transport</b>	
• Transport slides within 24 hours	
• Do not refrigerate as chill can alter cell morphology	

**Step 1 Materials for finger pricks:**

- Disinfectant
- Swabs
- Microscope slides (with or without frosted end)
- Sterile lancets
- Special slide as spreader
- Disposable gloves



**Step 2 Finger-prick (capillary blood)**

- Select the third finger (big toe can be used with children).
- Use cotton wool lightly soaked in alcohol to clean the finger, using firm strokes to remove grease from the ball of the finger.
- Let finger air-dry.
- With a sterile lancet puncture the ball of the finger using a quick rolling action.



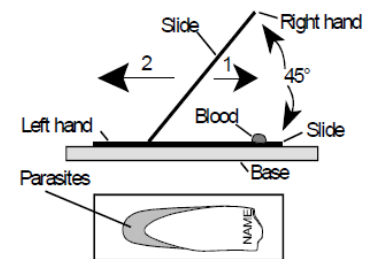
**Step 3**

- By applying gentle pressure to the finger express the first drop of blood and wipe it away with dry cotton wool.
- Make sure no strands of cotton remain on the finger.
- Working quickly with capillary blood and handling clean slides only by the edges, apply a gentle pressure to the finger and collect a single small drop of blood about the size ● on the end of the slide. This is for the **thin film**.



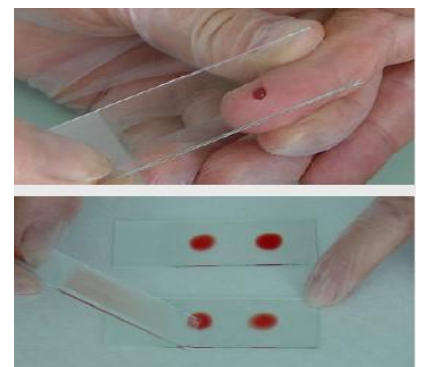
**Step 4 Thin films (capillary blood)**

- Take another clean slide to act as a "spreader".
- Place the slide with the blood drops resting on a flat, firm surface.
- Touch the small drop with the spreader (1) and allow the blood to run along its edge.
- Firmly push the spreader along the slide (2), away from the drops, keeping the spreader at an angle of 45°. Make sure the spreader is in even contact with the surface of the slide.

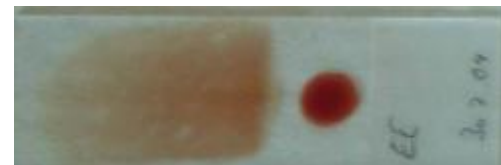


**Step 5 Thick films (Capillary blood)**

- Apply gentle pressure to the finger and collect two larger drops, about a size ●, on the slide as shown in the upper picture.
- Handle the "spreader" by the edge, using the corner to spread the blood in a circular form with 3-6 movements



**Step 6** Combination of a thin and a thick film on the same slide

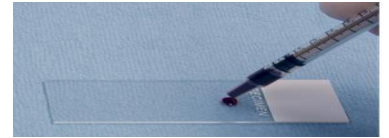


# BLOOD SMEAR PREPARATION FOR HAEMATOLOGY

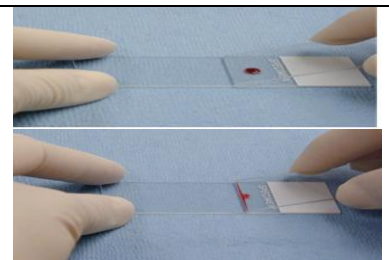
## Aim of blood smear

Examination of thin blood films is important in the investigation and management of anaemia, infections, and other conditions which produce changes in the appearance of blood cells and differential white cell count.

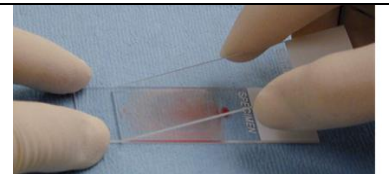
- Step 1**
- Fill a capillary tube three-quarter full with the anticoagulated specimen (EDTA).
  - Place a drop of blood, about 2 mm in diameter, approximately an inch from the frosted area of the slide.



- Step 2**
- Place the slide on a flat surface, and hold the narrow side of the non-frosted edge between your left thumb and forefinger.
  - With your right hand, place the smooth clean edge of a second "spreader" slide on the specimen slide, just in front of the blood drop.
  - Hold the "spreader" slide at a 30° angle, and draw it back against the drop of blood.
  - Allow the blood to spread almost to the edges of the slide



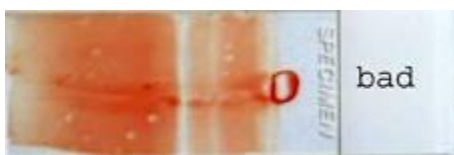
- Step 3**
- Push the "spreader" forward with one light, smooth, and fluid motion. A thin film of blood in the shape of a bullet with a feathered edge will remain on the slide.



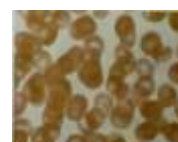
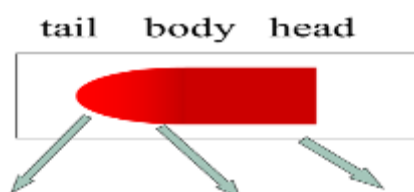
- Step 4**
- Label the frosted edge with patient name, ID number and date.
  - Allow the blood film to air-dry completely before staining. **Do not** blow to dry. The moisture from your breath will cause RBC artifact.



**Bad slide**



**Good slide**



## SPECIAL PROCEDURES FOR HISTOPATHOLOGY/CYTOLOGY TEST

### Histopathology

Please **do not combine** Histopathology and Cytology requests from the same patient into one request form.

### Specimen Containers

Please use containers which would enable easy identification and its removal from the container in the laboratory.

#### Guidelines:

- 1) Containers should preferably be transparent so that laboratory and other staff can see and verify the specimen without having to open the cap.
- 2) The mouth of the containers should not be smaller than the body. In narrow-mouthed containers, the tissue may damage while the specimen being removed, especially when the specimen is larger than the mouth.
- 3) Containers should be of adequate size so that it has enough capacity to hold the specimen **AND** at least thrice its volume of fixative.
- 4) Containers should be appropriately labeled and tally with the request form.

### Fixative

Please **do not** place tissue in fixative if it is a **frozen section** specimen.

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

If delay in transportation to laboratory is expected or if fixative is not available, please keep specimen in refrigerator at **4°C** but **DO NOT FREEZE** the specimen.

Tissues not placed in fixatives will undergo **autolysis**. In such cases, lysed blood could be seen in the solution. The tissue will also not change its colour from bright red to dull chocolate brown. Please ask your staff to transfer to formalin fixative if you suspect autolysis is occurring.

### Small Biopsies

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

If incisional biopsies are done, please try to obtain wedges of tissue instead of irregular fragments. Irregular fragments are difficult to orientate and interpret. In general, the larger the lesion, the bigger should be the incisional biopsy specimen. The myth that the more obvious the tumour is malignant, the smaller the biopsy specimen needed, is wrong.

Paired structures (such as vagi, vas deferentia or fallopian tubes) could be placed into the same container if one of these could be easily distinguished from the other (e.g. tag one by suture). Otherwise, biopsies from multiple sites should be placed in different containers.

Please do not wrap small biopsies in gauze as they are very difficult to retrieve once they get fix onto the gauze.

## Large Specimen

Please slice open the specimen. For better photography, please make good even cuts.

Use liberal amounts of fixative and select a large container so that specimen shall not be distorted or moulded by the container. Enough formalin should be used so that the specimen is freely submerged in the fixative solution. If the specimen floats, ensure the exposed surface is covered by gauze.

Refrigerate (but **do not freeze**) specimen if transport to laboratory is not expected immediately. For empty organs such as urinary bladders or gut, cut open and empty the contents. Please note that surgical margins (e.g. pneumonectomy) could not be evaluated microscopically if these are closed with metal wires.

Large specimen could also be sent un-fixed as un-fixed tissues are better for photography. Please wrap these un-fixed tissues in **saline soaked gauze** to avoid desiccation. Un-fixed specimen must be **refrigerated immediately** while waiting for transfer to the laboratory.

All specimens that are to be transported outstation must also be fixed.

To assist orientation of large specimens, sutures could be placed in appropriate areas and described in the request forms. For example, borders of the pectoralis muscle could be marked so that the pathologist could divide axillary nodes into levels. Areas of interest (such as margins, lymph node groups) which the surgeon wants microscopic studies done could also be marked by sutures.

## Frozen Section Specimen

Make sure tissue is not calcified or ossified.

Please make sure the doctor's name and phone number (with exact extension) are recorded in request form accompanying the specimen. **Do not add** fixative. **Do not wrap** tissue in gauze or cotton. **Do not ask** for frozen section if **infectious** aetiology is likely.

## Gynaecological Pap Smears (Pap Test)

Please submit only one slide per case and use only the request form reserved for PAP smears. This form helps to ensure all relevant clinical and gynaecological history are recorded.

For **hormonal evaluation**, please also submit another slide taken from the **upper 1/3** of the lateral vaginal wall.

For detecting **vaginal adenosis** submit **a scrapping from each quadrant** of the upper vagina.

It is important that the vaginal specimens be collected **before** the cervical specimen is obtained, and that the areas to be sampled are **first swabbed** to remove any contaminating secretion from the cervix.

## Sensitivity and Specificity

PAP test is not a perfect test. Precise data on the sensitivity and specificity of PAP smears are lacking due to a variety of factors including the quality of screening laboratory, definition of positive cases and methodology of the studies.

A **false negative rate** (missing out precancerous cells) of about 5-45% is most frequently quoted (i.e. **sensitivity** of **55 to 95%**). Up to **2/3** of the false negatives are due to factors related to **the collection procedure**. The **specificity** of a positive test (presence of precancerous cells) is probably **90-97%**.

Despite these limitations, the PAP test is still the **most effective** cancer screening test known.

## Screening Interval

It is recommended that PAP screening be initiated as soon as a woman is sexually active. This is repeated once every one to three years depending on individual risk factors. In view of the fact that precancerous lesions of the cervix usually take many years (estimated to be about 10 years or more) to progress into invasive cancers, this screening interval is acceptable. If there had been three successive normal smears, screening interval may be increased. Screening may also be discontinued for women aged 65 years and over at the discretion of the physician provided previous smears are normal.

**PAP tests are screening tests, not diagnostic tests. Hence, any patient suspected of having cervical cancer should have a cervical biopsy rather than a PAP test.**

## Patient Preparation

Advise patient as follows:

- 1) Do not use a vaginal douche or topical vaginal medications for 48 hours prior to examination.
- 2) Do not have sexual intercourse for 24 hours prior to examination.
- 3) Schedule examination 14 days after onset of the last menstrual period.

## PAP Smears: Conventional

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

NOTE: The PAP test is a screening test for cervical cancer with inherent false negative results.

### Specimen Collection

A spatula and cytobrush are a very effective sampling combination. Collect with a spatula first, followed by the cytobrush

Ectocervical/Endocervical Scraping – it is the single **most productive sample** and should be taken to sample the entire **squamocolumnar junction**. Use the **spatula** for scraping of the ectocervix.

Cytobrush provides a **superior sample** from the **endocervical canal** as compared to swab. The brush should be used according to the instructions and should **not be used** on **pregnant patients** or to sample the endometrium.

The brush specimen should be **in addition to**, never instead of, the ectocervical scraping

<b>Labeling Slides:</b>	The patient's first name and IC Number must be written in pencil on the frosted end of the slide
<b>Smears:</b>	<p>Smears should be made with <b>one or two swipes</b> of the spatula on the slide, not with a mixing motion. The cytobrush should be <b>rolled</b> on the slide.</p> <p>The smear should be obtained about <b>mid-cycle</b>, or about day 14, from a woman of childbearing age</p>
<b>Fixation:</b>	Rapid fixation is critical for good quality smears. The smears should be fixed immediately to avoid air-drying. If an aerosol spray is used, the spray nozzle should be about <b>twelve inches</b> from the slide. If held too close, the spray "freezes" the cells and also lifts them from the slide, causing them to clump.
<b>Requisition Form</b>	<p>It is important that clinical information is also included, as it helps in the interpretation of the specimen. Clinical information should include:</p> <ul style="list-style-type: none"> <li>• Patient's First and Last Name</li> <li>• Date of birth</li> <li>• LMP (last menstrual period)</li> <li>• Hormonal status (e.g. post-partum, post-menopausal, etc.)</li> <li>• Hormonal therapy (including birth control pills), other therapy (e.g. cautery)</li> <li>• Any history of prior abnormal Pap smears</li> <li>• Specimen Source</li> <li>• Collection Date</li> </ul>

## Reporting of PAP Smear

The **PAP classification** had been considered outdated and inadequate because of the new knowledge about cervical cancer. This system of classification has no equivalent term in histological diagnosis.

Currently, the two most widely used systems are the **CIN** and the **Bethesda** systems. BP Lab reports the PAP test using a combination of these systems because many doctors are more familiar with the PAP classification. We believe that it is important for the doctors to understand the report and explain it to their patients. Hence, until most doctors are familiar with the Bethesda system, we will still include a statement of the PAP classification in our reports.



The following table is an estimated equivalent terms in the various systems of PAP smear classification.

PAP	DYSPLASIA	CIN	BETHESDA (1988)	BETHESDA (2001)
0	Unsatisfactory	Unsatisfactory	Unsatisfactory	Unsatisfactory
I	Negative	Negative	WNL (Within Normal Limits)	NILM
II	Negative	Negative	BCC	NILM
III	No term	No term	ASCUS/AGUS	ASCUS/ASC-H
III	Mild	I	LGSIL	LGSIL
No term	Moderate	II	HGSIL	HGSIL
IV	Severe	III	HGSIL	HGSIL
IV	CIS	III	HGSIL	HGSIL
V	Carcinoma	Carcinoma	Carcinoma	Carcinoma

**Notes:**

- 1) CIS – Carcinoma in situ.
- 2) WNL – Within Normal Limits.
- 3) BCC – Benign cellular changes. These include those due to infection, atrophy, radiation or repair on Bethesda system).
- 4) NILM – Negative for intraepithelial lesion or malignancy. These include those that are within normal limits, benign cellular changes and other non-neoplastic findings.
- 5) ASCUS – Atypical squamous cells of undetermined significance. A high percentage of these cases will be found to have more severe lesion (LGSIL or HGSIL) subsequently.
- 6) AGUS – Atypical glandular cells of undetermined significance.
- 7) LGSIL/LSIL – Low grade squamous intraepithelial lesion. This includes CIN I changes. Cellular changes due to HPV are usually classified at least as LGSIL.
- 8) HGSIL/HSIL – High grade squamous intraepithelial lesion. This includes CIN II and III changes on histology.
- 9) ASC-H – Atypical squamous cells, cannot exclude high-grade squamous intraepithelial lesion.

**Adequacy of Smears**

Smears may be unsatisfactory for reporting due to the following:

- 1) The presence of an endocervical component (endocervical or metaplastic cells) is generally considered necessary to classify a smear as a satisfactory specimen. However, we have found positive smears even in the absence of an endocervical component and the data available is not conclusive as to whether absence of endocervical component will increase the risk of a false negative smear. 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.
- 2) Inadequate cells in smear
- 3) Too thick a smear
- 4) Too much blood, secretions or contaminating lubricants in the smear
- 5) Too much inflammatory cells
- 6) Too much crush artifacts
- 7) Poorly fixed smears or severe air drying artifact

## Non-Gynaecological Cytology

See gynaecological cytology for fixation and labeling of smears.

Urine, body cavity fluids, cerebrospinal fluids and secretions should be **refrigerated** or **transported in icebox** if delivery to laboratory is not immediate. Smears from FNAC procedures should be **fixed immediately**. Please provide at least two air-dried and alcohol-fixed smears.

### Air Drying Smears

This may be done by **vigorously waving** the smears in **room air**. For better result, you may also dry with **hair blower**, but do **not use hot hair**. Rapid drying reduces autolysis and improves cytologic preservation. (Note: Gynaecological PAP smears should **never** be air-dried.)

### Sputum Collection

Send expectorated sputum, **not** saliva, **not** nasal secretions.

Please ask patient to rinse his/her mouth and then expectorates a deep cough specimen into the container. An early morning deep cough yields the best specimen.

Sputum recovered from chest physiotherapy or tracheal suction are also acceptable. Sputum specimen with anthracotic histiocytes ('dust' cells) are considered good specimen.

### FNAC Technique for Solid Lesions

- 1) Label slides prior to performing procedure.
- 2) Use a 21 to 23 gauge needle, attached to a sterile syringe.
- 3) Introduce needle into the mass or lesion. While applying suction (negative pressure) move the needle up and down within the mass, **rotating it by turning your wrist at the same time**. The cutting edge of the needle tip will free cells in the lesion which are sucked **into the fine pore of the needle**. **Please avoid sucking cells into the body of the syringe**.
- 4) To increase cell yields, you may aim the needle at different angles each time.
- 5) If the lesion is expected to be **vascular**, you **may not need** to attach the syringe to the needle as no suction should be used.
- 6) The moment blood or any other material appears in the hub of the needle, stop suction and allow negative pressure to equalize. Thereafter withdraw needle from the lesion. Withdrawing the needle while applying suction will cause cellular material to be sucked into the body of the syringe, making them difficult to be delivered onto the slide.
- 7) Detach needle from syringe with the aspirated material still in the needle and hub.
- 8) Withdraw syringe to introduce air into it and then re-attach needle.
- 9) Position end of needle on a slide and expel one to two drops of aspirate onto it.

- 10) Use the needle to spread out the fragments as evenly as possible. If very large fragments are present, you may have to spread it flat with the help of another slide.
- 11) If too much blood is mixed with the cell fragments, as sometimes happen in thyroid aspirates or vascular lesions, use a piece of gauze to absorb the excess blood before spreading out the aspirate.
- 12) In general, try to spread the aspirate as thin and as even as possible.
- 13) Fix smears immediately before any drying has started. Air-dry some smears without fixation.
- 14) Repeat the above if there are still more aspirated material in the needle or hub and make more smears.
- 15) If there is no cellular material in the first pass, repeat aspirate may be performed with the needle at different angle.

### **FNAC of Cystic Lesions**

Aspirate as much fluid as possible and deliver these into leak-proof container without fixative or anticoagulant. The aspirated fluid should be **refrigerated** or **transported in icebox** if delivery to laboratory is not immediate. Aspirate any residual solid mass and prepare smears from it as described above.

# **SECTION II: Alphabetical listing of tests**

## Alphabetical listing of tests provided by BP Clinical Lab

1	<b>Test</b>	<b>ABO &amp; Rh Grouping</b>
	<b>Specimen</b>	3ml EDTA blood
	<b>Required</b>	
	<b>Reference Interval</b>	Blood group : A, B, AB, O , Rhesus : Positive / Negative
	<b>Method</b>	Antibody antigen reaction
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Detect clinically significant alloantibodies. Selecting compatible blood products for transfusion therapy
2	<b>Test</b>	<b>Ketone Screening (Acetoacetic Acid)</b>
	<b>Specimen</b>	20ml urine
	<b>Required</b>	
	<b>Reference Interval</b>	Negative/Positive
	<b>Method</b>	Urinalysis
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Monitoring of diabetic patients, prolonged illness.
3	<b>Test</b>	<b>Alphafoetoprotein (AFP)</b>
	<b>Specimen</b>	Serum /Plasma
	<b>Required</b>	
	<b>Reference Interval</b>	Up to 15.00 ng/ml
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily
	<b>Medical Indication</b>	Tumour marker for testicular and liver tumours
4	<b>Test</b>	<b>Albumin</b>
	<b>Specimen</b>	3ml plain blood
	<b>Required</b>	
	<b>Reference Interval</b>	3.5 - 5.2 g/dl
	<b>Method</b>	Bromocresol Green
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Indicator of nutritional status. Liver Function Test
5	<b>Test</b>	<b>Alkaline Phosphatase</b>
	<b>Specimen</b>	3ml plain blood
	<b>Required</b>	
	<b>Reference Interval</b>	1-12 years old: <500 U/L, Male >20 years old, Female >15 years old: 40- 150 U/L Male 12 – 15 years old: <750 U/L
	<b>Method</b>	IFCC
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Liver profile assessment. Evaluation of metabolic bone disease Diagnosis & monitoring treatment of liver, bone, intestinal & parathyroid disease

6	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Alanine Transaminase (ALT,SGPT)</b> 3ml plain blood 0 - 55 U/L IFCC Daily, 24 hours Diagnosis & monitoring of liver disease associated with hepatic necrosis. Liver profile assessment
7	<b>Test</b> <b>Lab Section</b>  <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Amphetamine/ Methamphetamine</b> Urinalysis department  20 ml Urine Non-Reactive Enzyme Immunoassay Daily,24 hours Detects the presence of Amphetamine, methamphetamine, & others amphetamine like substances in urine. Used to evaluate for suspected drug abuse or overdose
8	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Amylase (Diatase)</b> 20 ml random urine 32 – 641 U/L 2-Chloro-PNP-a-maltotrioside 3 days Assessment of acute rejection of bladder-drained pancreas transplants. Differential diagnosis of acute pancreatitis
9	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Amylase (serum)</b> 3ml plain blood 25 -125 U/L 2 Chloro-PNP-a-maltotrioside 3 days Differential diagnosis of pancreatic disease. Diagnosing acute pancreatitis
10	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Antineutrophil Cytoplasmic Antibodies (ANCA)</b> 3ml Plain Serum < 5 U/mL : Negative Manual ELISA 1 week Evaluating patients suspected of having autoimmune vasculitis (both Wegener granulomatosis [WG] and microscopic polyangiitis)

11	<b>Test</b> <b>Lab Section</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Anti-Hepatitis B Core Antibody (Anti-HBc)IgM</b> Referral 3ml plain blood Non-reactive 1 week A "reactive" result suggests acute or very recent hepatitis B infection
12	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Anti-Hepatitis B e Antibody (Anti-HBe)</b> 3ml plain blood Non-reactive Chemiluminescence Immunoassay Daily Indicates sero-conversion from infective stage, suggesting good prognosis for resolution of acute infection
13	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Anti-Hepatitis B Surface Antibody (Anti-HBs)</b> 3ml plain blood Non-reactive Chemiluminescence Immunoassay Daily Presence of hepatitis B surface antibody suggests previous hepatitis B infection or immunization
14	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Anti-Hepatitis C Antibody (Anti-HCV)</b> 3ml plain blood Non-reactive Chemiluminescence Immunoassay Daily A "reactive " results suggests that a patient has been or is currently infected with Hepatitis C virus
15	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Apolipoprotein A1/B</b> 3ml plain blood/ EDTA blood (fasting) Apolipoprotein A1 : Male : 95 - 186 mg/dl, Female : 101 - 223 mg/dl Apolipoprotein B : Male 49 - 173 mg/dl, Female : 53 - 182 mg/dl Immuno-turbidimetric 1 week Second-line test for ascribing cardiovascular disease. Evaluation of risk for atherosclerotic disease. Definitive studies of cardiac risk factors in individuals with significant family histories of coronary artery disease or other increased risk factors. Follow-up studies in individual with abnormal LDL cholesterol levels. Confirmation of suspected abetalipoproteinemia or hypobetalipoproteinemia

16	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Anti-Streptolysin O Titer (ASOT)</b> 3ml plain blood Negative (<200 IU/mL) Antibody-Antigen Reaction, Latex Agglutination test Daily, 24 hours Demonstration of acute or recent streptococcal infection causing rheumatic fever or glomerulonephritis.
17	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Aspartate Aminotransferase (AST, SGOT)</b> 3ml plain blood 5 – 34 U/L IFCC method Daily, 24 hours As an aid in diagnosis and monitoring liver disease, particularly diseases resulting in destruction of hepatocytes. Assessment of Liver Profile. Diagnosis of Acute Myocardial Infarct.
18	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Beta-2-Microglobulin</b> 3ml plain blood 0.97 - 2.64 mg/L Immuno-turbidimetric 1 week Prognosis assessment of multiple myeloma, evaluation of renal tubular disorders, management of multiple myeloma and lymphoma. Elevated levels seen in renal insufficiency
19	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bence Jones Protein</b> 20ml urine Positive/Negative Bradshaw's test 2-3 days Detected in multiple myeloma & amyloidosis. Monitoring patients with monoclonal gammopathies
20	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bicarbonate</b> 3ml plain blood (send to lab immediately) 23 - 34 mmol/L I.S.E Indirect Potentiometry Daily, 24 hours Evaluate acid-base status. Significant indicator of electrolyte dispersion & anion deficit. Diagnosis & monitoring of treatment in serious disorders associated with acid-base imbalance in the regulatory & metabolic systems



21	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bile Pigments (Bilirubin &amp; Urobilinogen)</b> 20ml urine Negative/Positive Urinalysis 2-3 days Preferred test during symptomatic periods for acute intermittent porphyria, hereditary corporporphyria & variegate porphyria
22	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bilirubin, Conjugated, Unconjugated, Total</b> 3ml plain blood Total : Adults : 0.2 - 1.2 mg/dl, Newborn : up to 10.0 mg/dl Direct : up to 0.5 mg/dl Diazonium Salt Daily, 24 hours Evaluation of jaundice and liver functions. Differential diagnosis of jaundice. Evaluating a wide range of diseases affecting the production, uptake, storage, metabolism or excretion of bilirubin
23	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bilirubin, Neonatal</b> plain blood in capillary tube Up to 10.0 mg/dl Direct spectrophotometric method Daily, 24 hours Diagnosis of neonatal jaundice.
24	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Bilirubin, Total</b> 3ml plain blood Adult: Up to 1.2 mg/dL Newborn: <10.0 mg/dL Diazonium Salt. Daily, 24 hours For assessing liver function, evaluating a wide range of diseases affecting the production, uptake, storage, metabolism or excretion of bilirubin, to monitor diseases causing jaundice in newborn and monitoring the efficacy of neonatal phototherapy.
25	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Chlamydia IgG</b> 3ml Plain Blood/Serum <0.9 No detectable antibody C.trachomatic IgG ; 0.9-1.1 Borderline Positive; >1.1 Detectable antibody to C.trachomatic IgG Enzyme-linked Immunosorbent assay 1 week Screening test in detection of IgG antibody to Chlamydia Trachomatis

26	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cytomegalovirus IgM</b> 3ml plain blood <0.90 Negative, 0.90 -0.99 Equivocal, ≥1.00 Positive Chemiluminescence Immunoassay 1 week A 'Reactive' results suggests current active cytomegalovirus infection
27	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cytomegalovirus IgG</b> 3ml plain blood <0.90 Negative, 0.90 -0.99 Equivocal, ≥1.00 Positive Chemiluminescence Immunoassay 1 week A 'Reactive' results suggests a previous cytomegalovirus infection
28	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>CA125 (Tumour Marker)</b> 3ml plain blood 0.0 -35.0 U/ml Chemiluminescence immunoassay Daily,24 Hours Tumour marker for ovarian cancer
29	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>CA15-3 (Tumour marker)</b> 3ml plain blood 0.0 -31.3 U/ml Chemiluminescence immunoassay Daily,24 Hours Tumour marker for stage II or III breast cancer.
30	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>CA19.9 ( Tumour marker)</b> 3ml plain blood 0.0 -37.0 U/ml Chemiluminescence immunoassay Daily,24 Hours Tumour marker for pancreatic cancer.
31	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Calcium</b> 3ml plain blood 8.4 - 10.2 mg/dL Arsenazo Dye Daily, 24 hours Evaluation of calcium metabolism. Diagnosis & monitoring of a wide range of disorders including diseases of bone, kidney, parathyroid

gland, or gastrointestinal tract. Calcium levels may also reflect abnormal Vitamin D or protein levels

32	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Calcium (Urine)</b> 24 hours urine (preservative 10ml concentrated HCL)  100 - 300 mg/24 hrs Arsenazo Dye Daily, 24 hours Evaluation of calcium metabolism. Identification of abnormal physiologic states causing excess or suppressed excretion of calcium, such as hyperparathyroidism, Vitamin D abnormality, disease that destroy bone, prostate cancer & drug treatment such as thiazide therapy
33	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cannabinoids (Urine)</b> 25 ml Urine  Non-Reactive Enzyme Immunoassay Daily, 24 Hours Screen to detect the marijuana exposure & abuse by measures the level of by-products of cannabis in urine
34	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>C-peptide</b> 3ml plain blood/serum (fasting)  0.78 - 5.19 ng/mL Chemiluminometric (CMIA) 1 week Evaluate residual B-cell function in insulin-dependent diabetics Aids in differential diagnosis of hypoglycaemia (includes factitious hypoglycaemia, insulin autoimmune hypoglycaemia & insulinoma). Diagnostic workup of hypoglycemia
35	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Carcinoembryonic Antigen (CEA)</b> 3ml plain blood  Up to 5.00 ng/mL Chemiluminescence immunoassay Daily, 24 Hours Tumour marker for colorectal & pancreatic cancer increased level seen in smokers

36	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Chloride</b> 3ml plain blood 98 - 107 mmol/L I.S.E Indirect Potentiometry Daily, 24 hours Evaluation of electrolyte & acid-base status
37	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Chloride (Urine)</b> 24 hour urine 110-250 mmol/24 hours I.S.E Indirect Potentiometry Daily, 24 hours Indicator of fluid balance, acid-base homeostasis & electrolyte balance
38	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cholestrol, HDL</b> 3ml plain blood (fasting) > 40 mg/dL Direct "Elimination Method" Daily, 24 hours Cardiovascular risk assessment. Negative risk factor for coronary heart disease (CHD)
39	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cholestrol, LDL</b> 3ml plain blood (fasting) < 100 mg/dL Calculated based on total, HDL Cholesterol and Triglycerides Daily, 24 hours Evaluation of cardiovascular risk.
40	<b>Test</b> <b>Specimen</b> <b>Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cholesterol, Total</b> 3ml plain blood (fasting) < 200 mg/dL Enzymatic Colourimetric Daily, 24 hours Evaluation of cardiovascular risk. Identify the presence of hyperlipidaemia & ascribe risk for coronary disease

41	<b>Test</b>	<b>CK-MB</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male: Up to 5.2 ng/mL Female: Up to 3.1 ng/mL
	<b>Method</b>	Immunoinhibition
	<b>Turnaround Time</b>	2-3 days
	<b>Medical Indication</b>	Diagnosis of acute myocardial infarction. The serial quantitation of CK-MB levels performed at admission & 8-hours, 16-hours & 24-hours after admission has been used as an aid in the diagnosis of myocardial injury
42	<b>Test</b>	<b>Cholinesterase (Pseudocholinesterase)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 4,389 – 10,928 U/L, Female : 2,879 – 12,669 U/L
	<b>Method</b>	Butyl-thiocholine
	<b>Turnaround Time</b>	3 days
	<b>Medical Indication</b>	Marker for organophosphate insecticide exposure. Monitoring patients with liver disease, particularly those undergoing liver transplantation
43	<b>Test</b>	<b>Cocaine Screening</b>
	<b>Specimen Required</b>	20ml fresh urine
	<b>Reference Interval</b>	Non-Reactive
	<b>Method</b>	<b>One Step Drug Test Strip</b>
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screen to detect the Cocaine exposure & abuse
44	<b>Test</b>	<b>Complement 3 (C3)</b>
	<b>Lab Section</b>	Send to laboratory immediately
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male (1 – 14 years) : 80-170 mg/dl , Female (1 – 14 years): 82-173 mg/dl Male (>14 – 80 years): 82 – 185 mg/dl Female (>14 – 80 years): 83 – 193 mg/dl
	<b>Method</b>	Immunoturbidimetry
	<b>Turnaround Time</b>	1 week
	<b>Medical Indication</b>	Acute phase protein. Useful in screening for classic & activation of alternate complement pathway. Decreased levels seen in immune complex diseases (esp. lupus nephritis) acute glomerulonephritis, massive necrosis, viraemia, sepsis, hereditary deficiency & infancy.

45	<b>Test</b> <b>Lab Section</b> <b>Specimen Required</b> <b>Reference Interval</b>  <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Complement 4 (C4)</b> Send to laboratory immediately 3ml plain blood  Male (1 – 14 years): 14.0 – 44.0 mg/dl Female (1 – 14 years): 13.0 – 46.0 mg/dl Male (>14 – 80 years): 15.0 – 53.0 mg/dl Female (>14 – 80 years): 15.0 – 57.0 mg/dl  Immunoturbidimetry 1 Week Decreased levels seen in immune complex disease, hereditary deficiency, acute glomerulonephritis, infancy or when classic pathway activated.
46	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Coomb's Test Direct</b> 3ml EDTA blood  Negative/ Positive Antibody antigen reaction Daily, 24 hours Detect the presence of globulins (IgG and C3d) coating red cells in autoimmune hemolytic anemia, hemolytic transfusion reactions, drug-induced hemolytic anemia
47	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Coomb's Test (Both Direct &amp; Indirect)</b> 3ml EDTA blood, 3ml plain blood  Negative / Positive Antibody antigen reaction Daily, 24 hours Detect the presence of globulins (IgG and C3d) coating red cells in autoimmune hemolytic anemia, hemolytic transfusion reactions, drug-induced hemolytic anemia
48	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Cortisol ,urine</b> 24 hours Urine  4.3-176.0 ug/24hours (11.87 - 485.76 nmol/24 hours) Chemiluminescent microparticle immunoassay (CMIA) 3 days Screening test for Cushing 's syndrome

49	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>CRP, High Sensitive (hsCRP)</b> <b>3ml plain blood</b> 0.00 - 0.50 mg/dL (0.0 – 5.0 mg/L) Turbidimetric/Immunoturbidimetric <b>Daily, 24 hours</b> Used as a marker of general diagnostic indicator of infections and inflammation, to monitor patient response to pharmacological therapy and surgery. It is also used for assessment of risk of developing myocardial infarction in patients presenting with acute coronary syndromes, risk of developing cardiovascular disease or ischemic events in individuals who do not manifest disease at present. For risk management of coronary heart disease and for early detection of infection in paediatric patients.
50	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Creatinine</b> <b>3ml plain blood</b> Male : 0.72 - 1.25 mg/dL, Female : 0.57 - 1.11 mg/dL Alkaline Picrate Daily, 24 hours Diagnosis and monitor acute renal disease. Renal function test.
51	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b>  <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Creatinine (Urine)</b> 24 hour urine, <a href="#">random urine</a> <u>24 hours</u> Male: 950 – 2,490 mg/day, Female: 710 – 1,650 mg/day <u>Random</u> Male: 63 – 166 mg/dl, Female: 47 – 110 mg/dl  Alkaline Picrate Daily, 24 hours Confirms completeness of 24 hours urine collection. Calculate creatinine clearance, measure of renal function
52	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Creatinine Phosphokinase (CK)</b> <b>3ml plain blood</b> Male : 30 - 200 U/L, Female : 29 - 168 U/L NAC Activator 2-3 days Evaluate and monitor disorders of skeletal and cardiac muscle. Diagnosis and monitoring of myocardial infarction & myopathies such as the progressive Duchenne muscular dystrophy
53	<b>Test</b> <b>Specimen</b>	<b>Creatinine Clearance Test</b> 3ml plain blood, 24 hour urine sample

	<b>Required</b>																																																			
	<b>Reference Interval</b>	Male: 66 – 163 ml/min, Female: 66 – 165 ml/min																																																		
	<b>Method</b>	Alkaline Picrate																																																		
	<b>Turnaround Time</b>	Daily, 24 hours																																																		
	<b>Medical Indication</b>	Renal function test, measure Glomerular Filtration Rate																																																		
54	<b>Test</b>	<b>Dengue NS1 Ag</b>																																																		
	<b>Specimen</b>	Whole blood/3ml plain blood																																																		
	<b>Required</b>																																																			
	<b>Reference Interval</b>	Negative																																																		
	<b>Method</b>	In vitro Immunochromatographic,one step assay																																																		
	<b>Turnaround Time</b>	Daily,24 hours																																																		
	<b>Medical Indication</b>	Detect Dengue Virus NS1 Antigen in human serum, plasma or whole blood																																																		
55	<b>Test</b>	<b>Dengue IgG/IgM</b>																																																		
	<b>Specimen</b>	3ml plain blood																																																		
	<b>Required</b>																																																			
	<b>Reference Interval</b>	Negative																																																		
	<b>Method</b>	Solid Phase Immunochromatographic assay																																																		
	<b>Turnaround Time</b>	Daily, 24 hours																																																		
	<b>Medical Indication</b>	Detection of IgG, IgM antibodies to Dengue Virus in Human serum or Plasma																																																		
56	<b>Test</b>	<b>Dehydroepiandrosterone Sulphate (DHEAS)</b>																																																		
	<b>Specimen</b>	3ml plain blood																																																		
	<b>Required</b>																																																			
	<b>Reference Interval</b>	<table> <tr> <th>Gender</th><th>Age ( Years)</th><th>Normal range (ug/dl)</th></tr> <tr> <td rowspan="5">Children</td><td>&lt;1 week</td><td>24.6-302.8</td></tr> <tr> <td>1-4 weeks</td><td>8.5-317.3</td></tr> <tr> <td>1-12 months</td><td>31.6-214.1</td></tr> <tr> <td>1-4 years</td><td>32.7-276.0</td></tr> <tr> <td>5-10 years</td><td>24.4-209.7</td></tr> <tr> <td rowspan="8">Male</td><td>11-14 years</td><td>16.6-242.7</td></tr> <tr> <td>15-19 years</td><td>45.1-385.0</td></tr> <tr> <td>20-24 years</td><td>238.4-539.3</td></tr> <tr> <td>25-34 years</td><td>167.9-591.9</td></tr> <tr> <td>35-44 years</td><td>139.7-484.4</td></tr> <tr> <td>45-54 years</td><td>136.2-447.6</td></tr> <tr> <td>55-64 years</td><td>48.6-361.8</td></tr> <tr> <td>65-70 years</td><td>228.5-283.6</td></tr> <tr> <td rowspan="6">Female</td><td>11-14 years</td><td>8.6-169.8</td></tr> <tr> <td>15-19 years</td><td>61.2-493.6</td></tr> <tr> <td>20-24 years</td><td>134.2-407.4</td></tr> <tr> <td>25-34 years</td><td>95.8-511.7</td></tr> <tr> <td>35-44 years</td><td>74.8-410.2</td></tr> <tr> <td>45-54 years</td><td>56.2-282.9</td></tr> <tr> <td></td><td>55-64 years</td><td>29.7-182.2</td></tr> <tr> <td></td><td>65-70 years</td><td>33.6-78.9</td></tr> </table>	Gender	Age ( Years)	Normal range (ug/dl)	Children	<1 week	24.6-302.8	1-4 weeks	8.5-317.3	1-12 months	31.6-214.1	1-4 years	32.7-276.0	5-10 years	24.4-209.7	Male	11-14 years	16.6-242.7	15-19 years	45.1-385.0	20-24 years	238.4-539.3	25-34 years	167.9-591.9	35-44 years	139.7-484.4	45-54 years	136.2-447.6	55-64 years	48.6-361.8	65-70 years	228.5-283.6	Female	11-14 years	8.6-169.8	15-19 years	61.2-493.6	20-24 years	134.2-407.4	25-34 years	95.8-511.7	35-44 years	74.8-410.2	45-54 years	56.2-282.9		55-64 years	29.7-182.2		65-70 years	33.6-78.9
Gender	Age ( Years)	Normal range (ug/dl)																																																		
Children	<1 week	24.6-302.8																																																		
	1-4 weeks	8.5-317.3																																																		
	1-12 months	31.6-214.1																																																		
	1-4 years	32.7-276.0																																																		
	5-10 years	24.4-209.7																																																		
Male	11-14 years	16.6-242.7																																																		
	15-19 years	45.1-385.0																																																		
	20-24 years	238.4-539.3																																																		
	25-34 years	167.9-591.9																																																		
	35-44 years	139.7-484.4																																																		
	45-54 years	136.2-447.6																																																		
	55-64 years	48.6-361.8																																																		
	65-70 years	228.5-283.6																																																		
Female	11-14 years	8.6-169.8																																																		
	15-19 years	61.2-493.6																																																		
	20-24 years	134.2-407.4																																																		
	25-34 years	95.8-511.7																																																		
	35-44 years	74.8-410.2																																																		
	45-54 years	56.2-282.9																																																		
	55-64 years	29.7-182.2																																																		
	65-70 years	33.6-78.9																																																		



	<b>Method</b>	Electrochemiluminescence Immunoassay
	<b>Turnaround Time</b>	1 week
	<b>Medical Indication</b>	Evaluation of Androgen deficiency or excess state
57	<b>Test</b>	<b>DNA Double-Stranded (dsDNA) Antibodies, Quantitative</b>
	<b>Specimen Required</b>	3ml plain Serum
	<b>Reference Interval</b>	<10 IU/ml: Negative
	<b>Method</b>	Phadia 100 / EliA
	<b>Turnaround Time</b>	<b>1 week</b>
	<b>Medical Indication</b>	Evaluating patients with signs and symptoms consistent with systemic lupus erythematosus (SLE) Monitoring patients with documented SLE for flares in disease activity
58	<b>Test</b>	<b>Electrolytes (Na+, K+, Cl-)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Na+: 135-145 mmol/L, K+: 3.5 – 5.1 mmol/L Cl-: 98- 107 mmol/L
	<b>Method</b>	I.S.E. Indirect Ppotentiometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluation of electrolyte balance.
59	<b>Test</b>	<b>Epstein Barr Virus IgA antibody</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Titre < 8 Negative, 8-12 Equivocal, >12 Positive
	<b>Method</b>	Immunofluorescence
	<b>Turnaround Time</b>	3 days
	<b>Medical Indication</b>	May suggest severe diseases due to EBV, Screening test for Nasopharyngeal cancer
60	<b>Test</b>	<b>Erythrocyte Sedimentation Rate (ESR)</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Male : 0-16 mm/hr Female : 0 - 20 mm/hr
	<b>Method</b>	Manual Westergren Method, Micro TEST 1
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	A measure of acute phase response. Provides an index of disease progress
61	<b>Test</b>	<b>Estradiol</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 11-44 pg/ml (40.4 – 161.5 pmol/L) <u>Female</u> Follicular Phase : 21-251 pg/ml (77.1 – 921.4 pmol/L) Mid-cycle Peak : 38-649 pg/ml (139.5 – 2382.5 pmol/L)

		Luteal Phase : 21-312 pg/ml (77.1 – 1145.4 pmol/L)
		<u>Post Menopausal</u>
		Not on HRT : < 10-28 pg/mL (<36.7 – 102.8 pmol/L)
		On HRT : < 10-144 pg/mL (<36.7 – 528.6 pmol/L)
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Female: Assess hypothalamic -pituitary-ovarian axis Male: Investigate unexplained gynaecomastia
62	<b>Test</b>	<b>Fecal Occult Blood (FOB)</b>
	<b>Specimen Required</b>	Stool (fresh)
	<b>Reference Interval</b>	Negative
	<b>Method</b>	1 Step Fecal Occult Blood test Device, Rapid Chromatograph Immunoassay.
	<b>Turnaround Time</b>	2 days
	<b>Medical Indication</b>	Check for hidden (Occult) blood in the stool, aims to check subtle blood loss in the gastrointestinal tract
63	<b>Test</b>	<b>Follicle Stimulating Hormone (FSH)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 0.95-11.95 mIU/ml Normal Menstrual Female : Follicular Phase : 3.03 -8.08 mIU/mL Mid-cycle Peak : 2.55 - 16.69 mIU/mL Luteal Phase : 1.38 -5.47 mIU/mL Pregnant : < 0.3 mIU/mL Post Menopausal: 26.72-133.41 mIU/mL
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessment of hyperthalamic-pituitary gonadal axis in the diagnosis of amenorrhea, androgen deficiency & gonadal dysfunction.
64	<b>Test</b>	<b>Ferritin</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 21.81-274.66 ng/mL Female : 4.63-204.00 ng/mL
	<b>Method</b>	Chemiluminescent Microparticle Immunoassay (CMIA)
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Measurement of iron stores in iron deficiency anaemia & iron overload states e.g. Haemochromatosis
65	<b>Test</b>	<b>Folic Acid</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	3.1 - 20.5 ng/mL
	<b>Method</b>	Chemiluminescent Microparticle Immunoassay (CMIA)
	<b>Turnaround Time</b>	4 working days
	<b>Medical Indication</b>	Investigation of suspected folate deficiency & to monitor therapy

66	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Free Triiodothyronine (FT3)</b> 3ml plain blood 1.71 – 3.71 pg/mL Chemiluminescence immunoassay Daily, 24 hours For the quantitative determination of free triiodothyronine (Free T <sub>3</sub> ) in human serum and plasma as an aid in the assessment of thyroid status, useful in assessing the severity of the thyrotoxic state. It also provides further confirmation of hyperthyroidism, supplementing the tetraiodothyronine (T <sub>4</sub> ), sensitive thyrotropin (sTSH), and total T <sub>3</sub> assays. Evaluating clinically euthyroid patients who have an altered distribution of binding proteins. Monitoring thyroid hormone replacement therapy																														
67	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Free Thyroxine (FT4)</b> 3ml plain blood Adult: 0.70 – 1.48 ng/dL Newborn: 0.90 – 3.00 ng/dL Chemiluminescence immunoassay Daily, 24 hours Diagnosis of hyperthyroidism and hypothyroidism. Evaluation of suspected thyroid function disorders using free thyroxine measured together with thyroid-stimulating hormone, aid in the assessment of thyroid status.																														
68	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b>	<b>Full Blood Count</b> 3ml EDTA blood Haemoglobin level, WBC, RBC, Platelet count, Indices, WBC differential, peripheral blood film comment <table><tr><td><u>Male</u></td><td><u>Female</u></td></tr><tr><td>WBC : 4,000 - 11,000 /cmm</td><td>WBC : 4,000 - 11,000 /cmm</td></tr><tr><td>RBC : 4.5 - 6.0 M/cmm</td><td>RBC : 4.0 - 5.5 M/cmm</td></tr><tr><td>Hb : 12.5 - 17.5 g/dl</td><td>Hb : 11.5 - 15.5 g/dl</td></tr><tr><td>HCT : 40 - 50 %</td><td>HCT : 37 - 45%</td></tr><tr><td>MCV : 82 - 98 fl</td><td>MCV : 82 - 98 fl</td></tr><tr><td>MCH : 27 - 33 pg</td><td>MCH : 27 - 33 pg</td></tr><tr><td>MCHC : 31 - 35%</td><td>MCHC : 31 - 35%</td></tr><tr><td>Plt : 150,000 - 400,000 /cmm</td><td>Plt : 150,000 - 400,000 /cmm</td></tr><tr><td>RDW : 11.0 - 16.0%</td><td>RDW : 11.0 - 16.0%</td></tr><tr><td>Polymorph : 50 - 70%</td><td>Polymorph : 50-70%</td></tr><tr><td>Lymphocytes : 20 - 40%</td><td>Lymphocytes : 20 -40%</td></tr><tr><td>Monocytes : &lt;6%</td><td>Monocytes : &lt;6%</td></tr><tr><td>Eosinophils : &lt;4%</td><td>Eosinophils : &lt;4%</td></tr><tr><td>Basophils : &lt;1%</td><td>Basophils : &lt;1%</td></tr></table>	<u>Male</u>	<u>Female</u>	WBC : 4,000 - 11,000 /cmm	WBC : 4,000 - 11,000 /cmm	RBC : 4.5 - 6.0 M/cmm	RBC : 4.0 - 5.5 M/cmm	Hb : 12.5 - 17.5 g/dl	Hb : 11.5 - 15.5 g/dl	HCT : 40 - 50 %	HCT : 37 - 45%	MCV : 82 - 98 fl	MCV : 82 - 98 fl	MCH : 27 - 33 pg	MCH : 27 - 33 pg	MCHC : 31 - 35%	MCHC : 31 - 35%	Plt : 150,000 - 400,000 /cmm	Plt : 150,000 - 400,000 /cmm	RDW : 11.0 - 16.0%	RDW : 11.0 - 16.0%	Polymorph : 50 - 70%	Polymorph : 50-70%	Lymphocytes : 20 - 40%	Lymphocytes : 20 -40%	Monocytes : <6%	Monocytes : <6%	Eosinophils : <4%	Eosinophils : <4%	Basophils : <1%	Basophils : <1%
<u>Male</u>	<u>Female</u>																															
WBC : 4,000 - 11,000 /cmm	WBC : 4,000 - 11,000 /cmm																															
RBC : 4.5 - 6.0 M/cmm	RBC : 4.0 - 5.5 M/cmm																															
Hb : 12.5 - 17.5 g/dl	Hb : 11.5 - 15.5 g/dl																															
HCT : 40 - 50 %	HCT : 37 - 45%																															
MCV : 82 - 98 fl	MCV : 82 - 98 fl																															
MCH : 27 - 33 pg	MCH : 27 - 33 pg																															
MCHC : 31 - 35%	MCHC : 31 - 35%																															
Plt : 150,000 - 400,000 /cmm	Plt : 150,000 - 400,000 /cmm																															
RDW : 11.0 - 16.0%	RDW : 11.0 - 16.0%																															
Polymorph : 50 - 70%	Polymorph : 50-70%																															
Lymphocytes : 20 - 40%	Lymphocytes : 20 -40%																															
Monocytes : <6%	Monocytes : <6%																															
Eosinophils : <4%	Eosinophils : <4%																															
Basophils : <1%	Basophils : <1%																															

	<b>Method</b>	Light Scattering Flow Cytometry, Microscopy
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders, infection
69	<b>Test</b>	<b>Gamma Glutamyl 1 Transpeptidase (GGT)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 12 - 64 U/L, Female : 9 - 36 U/L
	<b>Method</b>	IFCC
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosing and monitoring hepatobiliary disease, the most sensitive enzymatic indicator of liver disease. Liver profile assessment. Screening test for occult alcoholism
70	<b>Test</b>	<b>Globulin</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	2.1 - 4.0 g/dL
	<b>Method</b>	Calculated based on Total Protein, Albumin
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Indicator of nutritional status. Liver Function Test
71	<b>Test</b>	<b>Glucose</b>
	<b>Specimen Required</b>	3ml fluoride blood
	<b>Reference Interval</b>	Fasting : ≤100 mg/dL, Random <140 mg/dL
	<b>Method</b>	Hexokinase
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosis & management of diabetes mellitus & other carbohydrate metabolism disorders including gestational diabetes, neonatal hypoglycemia, idiopathic hypoglycemia & pancreatic cell carcinoma
72	<b>Test</b>	<b>Glucose Tolerance Test (3 points)</b>
	<b>Specimen Required</b>	3ml fluoride blood at fasting, 1HPP and 2HPP
	<b>Reference Interval</b>	Fasting : ≤100 mg/dL, 1HPP : <200 mg/dL, 2HPP : < 140 mg/dL
	<b>Method</b>	Hexokinase
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosis of diabetes mellitus
73	<b>Test</b>	<b>Glucose -6 Phosphate Dehydrogenase (G6PD) Screening</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Deficiency Detected / Not Detected
	<b>Method</b>	Fluorescence Method
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Qualitative screening test for G6PD enzyme level.

(Note : Any recent blood transfusion or acute hemolysis can affect the result obtained)

74	<b>Test</b>	<b>Haemoglobin</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Male : Hb : 12.5 - 17.5 g/dl Female :Hb : 11.5 - 15.5 g/dl
	<b>Method</b>	Light Scattering Flow Cytometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders
75	<b>Test</b>	<b>Hb Electrophoresis</b>
	<b>Specimen Required</b>	2 x 3ml EDTA blood
	<b>Reference Interval</b>	Hb A2 : 2.1 - 3.7 % HB A : 96.8 - 97.9 % Hb F : <1.0 %
	<b>Method</b>	Capillary Electrophoresis
	<b>Turnaround Time</b>	2 weeks
	<b>Medical Indication</b>	Aids in diagnosis of Thalassemias and haemoglobin variants. Evaluation of unexplained microcytosis
76	<b>Test</b>	<b>HbA1c (Glycosylated Hb)</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Non-diabetic : <6%, Goal : <7%, Poor control : >8%
	<b>Method</b>	Turbidimetric inhibition immunoassay (TINIA)
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Long term monitoring of glucose control in diabetes. Diagnosis of diabetes
77	<b>Test</b>	<b>Hepatitis A IgG (Anti-HAV IgG)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-Reactive
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Detection of recent or previous exposure or immunity to hepatitis A
78	<b>Test</b>	<b>Hepatitis A IgM (Anti-HAV IgM)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-Reactive
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosis of acute or recent hepatitis A infection

79	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Hepatitis B e Antigen (-HBeAg)</b> 3ml plain blood Non-reactive Chemiluminescence Immunoassay Daily, 24 hours A 'reactive' results suggests current infectious hepatitis B infection
80	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Hepatitis B Surface Antigen (-HBsAg)</b> 3ml plain blood Non-reactive Chemiluminescence Immunoassay Daily A 'reactive' results suggests current infectious hepatitis B infection
81	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Hepatitis B Surface Antigen (HBsAg) Confirmatory Test (Qualitative)</b> 3ml plain blood Not Confirmed Specific Antibody Neutralization 1 week A reactive screen result confirmed as positive by hepatitis B surface antigen (HBsAg) confirmatory test indicative of acute or chronic hepatitis B virus (HBV) infection, or chronic HBV carrier state.
82	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Helicobacter pylori IgG</b> 3ml plain blood ≤0.90 Negative, 0.91-0.99 Equivocal, ≥1.00 Positive Enzyme Immunoassay 3 days Detection of IgG Antibodies to Helicobacter Pylori in serum
83	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Herpes Simplex Virus 1 IgM</b> 3ml plain blood <0.90 Negative, 0.90 -0.99 Equivocal, ≥1.00 Positive Enzyme Immunoassay 1 Week Diagnosis of Herpes simplex infection
84	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b>	<b>Herpes Simplex Virus 1 IgG</b> 3ml plain blood <0.90 Negative, 0.90-0.99 Equivocal, ≥1.00 Positive Enzyme Immunoassay 3 days

	<b>Medical Indication</b>	Diagnosis of Herpes simplex infection
85	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Herpes Simplex Virus 2 IgM</b> 3ml plain blood <0.90 Negative, 0.90-0.99 Equivocal, ≥1.00 Positive Solid Phase enzyme-linked Immunosorbent Assay Daily Diagnosis of Herpes simplex infection
86	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Herpes Simplex Virus 2 IgG</b> 3ml plain blood <0.90 Negative, 0.90-0.99 Equivocal, ≥1.00 Positive Solid Phase enzyme-linked Immunosorbent Assay Daily Diagnosis of Herpes simplex infection
87	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>HIV antibody-antigen</b> 3ml plain blood Non-Reactive Chemiluminescent microparticle Immunoassay Daily, 24 hours Diagnosis of HIV infection
88	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Homocysteine</b> 3ml plain blood FPIA/Direct Chemiluminescent Male: 5.46 – 16.20 µmol/L, Female: 4.44-13.56 Overall: 5.08 – 15.39 µmol/L Daily, 24 hours Assess CHD risk, obstetric complications & neural tube defects. Aid for screening patient suspected of having an inherited disorder for methionine metabolism
89	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Intact Parathyroid Hormone,</b> 3ml EDTA blood (fasting) Place specimen in ice and send to the laboratory immediately 15.0 – 68.3 pg/ml Chemiluminescence Immunoassay Daily Differential diagnosis of hyperparathyroidism & hypoparathyroidism
90	<b>Test</b> <b>Specimen Required</b>	<b>Insulin</b> 5ml plain blood (fasting) Fasting sample (10-12hrs) required

	<b>Reference Interval</b>	2.0-25.0 uU/L
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	1 Week
	<b>Medical Indication</b>	Differential diagnosis of hypoglycaemia (including factitious hypoglycaemia, insulin autoimmune hypoglycaemia & insulinoma)
91	<b>Test</b>	<b>Iron</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Males : 65 - 175 µg/dL, Female : 50 - 170 µg/dL
	<b>Method</b>	Spectrophotometrically
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening for chronic iron overload disease, particularly hereditary hemochromatosis. Diagnosis of iron deficiency. Evaluate red cell production & destruction, iron metabolism or iron transport
92	<b>Test</b>	<b>Lactate Dehydrogenase (LDH)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	125 – 220 U/L
	<b>Method</b>	IFCC
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Investigation of a variety of disease involving the heart, liver, kidney, lung & blood. Monitoring changes in tumor burden after chemotherapy, but elevations in cancer patients are too erratic to be used in diagnosis of cancer. Increased in megaloblastic & pernicious anaemia, extensive carcinomatosis, viral hepatitis, shock, hypoxia, extreme hyperthermia, cirrhosis, obstructive jaundice, renal diseases, skeletal muscle diseases, neoplastic diseases and congestive heart failure
93	<b>Test</b>	<b>Luteinising Hormone (LH)</b>
	<b>Specimen</b>	3ml plain blood
	<b>Reference Interval</b>	Males: 0.57 – 12.07 mIU/mL <u>Normally Menstruating Females</u> Follicular Phase: 1.80 – 11.78 mIU/mL Mid-Cycle Peak: 7.59 – 89.08 mIU/mL Luteal Phase: 0.56 – 14.00 mIU/mL Post Menopausal Females (without HRT): 5.16 – 61.99 mIU/mL
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessment of hyperthalamic-pituitary gonadal axis in the diagnosis of amenorrhea, androgen deficiency & gonadal dysfunction.
94	<b>Test</b>	<b>Magnesium</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	1.60 – 2.60 mg/dL
	<b>Method</b>	Arsenazo
	<b>Turnaround Time</b>	3 days



	<b>Medical Indication</b>	Determine deficiency or excess states. May be used to monitor preeclampsia patients being treated with magnesium sulfate.
95	<b>Test</b> <b>Lab Section</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Magnesium (Urine)</b> Referral 24 hours urine (preservative 10ml concentrated HCL) 6.0 - 10.0 mmol/day. Varies with diet Colorimetry 1 week Assessing cause of abnormal serum magnesium concentrations. Determining whether the body is receiving adequate nutrition.
96	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Malaria Parasite</b> 3ml EDTA blood Positive/ Negative Direct microscopy (thick and thin film) Daily, 24 hours Screening, detection& identification of malaria parasites.
97	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Measles IgG</b> 3ml plain blood Not-Detected <250mIU/mL Detected ≥ 250 mIU/mL Enzyme Immunoassay 1 Week A "reactive" results suggests previous exposure or immunization to measles.
98	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Microalbumin</b> 20ml random urine, 24 hour urine in 10ml concentrated HCL Random urine : <20 mg/L, 24 hour urine : <30mg/24 hours Immuno-turbidimetric Daily, 24 hours Early detection of nephropathy in patients with diabetes mellitus. Assessing the potential for early onset of nephropathy in diabetic patients
99	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Microalbumin ACR</b> 20ml random urine, 24 hour urine < 30 mg/g Calculated from 24 hour urine creatinine and microalbumin Daily, 24 hours Early detection of nephropathy in patients with diabetes mellitus. Assessing the potential for early onset of nephropathy in diabetic patients

100	<b>Test</b> <b>Specimen Required</b>	<b>Mirofilaria</b> 3ml EDTA blood
	<b>Reference Interval</b>	(Note : Certain type of microfilariae have a nocturnal periodicity, & the blood specimen is best taken between 10pm & 2am) Positive/ Negative
	<b>Method</b>	Direct microscopy (thick & thin film)
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Detection of microfilariae in peripheral blood
101	<b>Test</b> <b>Specimen Required</b>	<b>Monospot</b> 3ml plain blood
	<b>Reference Interval</b>	Negative
	<b>Method</b>	One Step rapid Latex particle Agglutination test
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Detection of infectious mononucleosis due to EBV
102	<b>Test</b> <b>Specimen Required</b>	<b>Morphine (Screening),Urine</b> 25 ml random urine
	<b>Reference Interval</b>	Negative
	<b>Method</b>	Homogenous Enzyme Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Detection of Opiates in Urine
103	<b>Test</b> <b>Lab Section</b> <b>Specimen Required</b>	<b>Osmolality (Urine)</b> Referral 20 ml random urine
	<b>Reference Interval</b>	100 - 1200 mmol/kg
	<b>Method</b>	Freezing Point Osmometry
	<b>Turnaround Time</b>	1 week
	<b>Medical Indication</b>	Assessing the concentration & diluting ability of the kidney. Assess fluid & electrolyte balance
104	<b>Test</b> <b>Lab Section</b> <b>Specimen Required</b>	<b>Osmolality</b> Referral 3ml plain blood
	<b>Reference Interval</b>	275 - 300 mmol/kg
	<b>Method</b>	Freezing Point Osmometry
	<b>Turnaround Time</b>	1 week
	<b>Medical Indication</b>	Evaluating acutely ill or comatose patients. Assess fluid & electrolyte balance
105	<b>Test</b> <b>Specimen Required</b>	<b>Packed Cell Volume (PCV)</b> 3ml EDTA blood
	<b>Reference Interval</b>	Male : HCT : 40 - 50 % Female : HCT : 37 - 45%
	<b>Method</b>	Light Scattering Flow Cytometry

	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders
106	<b>Test</b>	<b>Partial Thromboplastin Time (Act.), APTT</b>
	<b>Specimen Required</b>	Sodium Citrate
	<b>Reference Interval</b>	28 - 40 seconds
	<b>Method</b>	Clot Detection
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Monitoring heparin therapy (unfractionated heparin [UFH]). Screening for certain coagulation factor deficiencies. Detection of coagulation inhibitors such as lupus anticoagulant, specific factor inhibitors & non-specific inhibitors
107	<b>Test</b>	<b>Peripheral Blood Film</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Morphological description of WBC, RBC, platelet & other blood components
	<b>Method</b>	Direct microscopy
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders. Morphology review of blood cells
108	<b>Test</b>	<b>Phosphorus</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	2.3 - 4.7 mg/dL
	<b>Method</b>	Phosphomolybdate UV
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessment of calcium and phosphate disorders. Used in diagnosis & management of a variety of disorders including bone, parathyroid & renal disease
109	<b>Test</b>	<b>Platelet Count</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Plt : 150,000 - 400,000 /cmm
	<b>Method</b>	Light Scattering Flow Cytometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening for bleeding disorders, platelet dysfunction
110	<b>Test</b>	<b>Potassium</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	3.5 - 5.1 mmol/L
	<b>Method</b>	I.S.E Indirect Potentiometry
	<b>Turnaround Time</b>	Daily, 24 hours

	<b>Medical Indication</b>	Evaluation of electrolyte balance, cardiac arrhythmia, muscular weakness, hepatic encephalopathy & renal failure. Monitoring purpose during treatment of many conditions especially in diabetic ketoacidosis & any intravenous therapy for fluid replacement
111	<b>Test</b>	<b>Potassium (Urine)</b>
	<b>Specimen Required</b>	24 hour urine
	<b>Reference Interval</b>	25-125 mmol/24 hours
	<b>Method</b>	I.S.E Indirect Potentiometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluate electrolyte balance. Evaluation of hypo- or hyperkalemia.
112	<b>Test</b>	<b>Pregnancy test</b>
	<b>Specimen Required</b>	20ml urine
	<b>Reference Interval</b>	Negative/Positive
	<b>Method</b>	Rapid Test Kit
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening for pregnancy
113	<b>Test</b>	<b>Progesterone</b>
	<b>Specimen</b>	3ml plain blood
	<b>Reference Interval</b>	Male : <0.1 – 0.2 ng/mL Normally Menstruating Females : Follicular Phase : <0.1 – 0.3 ng/mL Luteal Phase : 1.2 – 15.9 ng/mL Pregnant : <0.3 mIU/ml Post Menopausal: <0.1 – 0.2 ng/mL Pregnant: First Trimester : 2.8 – 147.3 ng/mL Second Trimester : 22.5 – 95.3 ng/mL Third Trimester : 27.9 – 242.5 ng/mL
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess ovarian function. Assess abnormal pregnancy. Detect progestrone-secreting tumour.
114	<b>Test</b>	<b>Prolactin</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 3.46 – 19.40 ng/mL Female : 5.18 – 26.53 ng/mL  Postmenopausal : 1.8-20.3 ng/ml
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosis & management of pituitary adenoma. Investigation of hypogonadism

115	<b>Test</b>	<b>Protein (Total)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	6.4 - 8.3 g/dL
	<b>Method</b>	Biuret/ Endpoint
	<b>Turnaround Time</b>	3 days
	<b>Medical Indication</b>	Liver function test. Marker of nutritional status, establish hypoprotinaemia or hyperprotinaemia. Diagnosis & treatment of a variety of disease involving the liver, kidney, or bone marrow, as well as other metabolic or nutritional disorders.
116	<b>Test</b>	<b>Protein, Total (Urine)</b>
	<b>Specimen Required</b>	24 hour urine, keep specimen on ice during collection. Avoid collection of specimen within 24 hours of intense exercise since this can falsely elevate protein excretion.
	<b>Reference Interval</b>	<300 mg/day
	<b>Method</b>	Turbidimetric
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluation of renal disease. Indicator of renal impairment. To detect increased permeability of the blood-brain barrier to plasma proteins. To detect increased intrathecal production of immunoglobulins. Screening for monoclonal gammopathy.
117	<b>Test</b>	<b>Prothrombin Time</b>
	<b>Specimen Required</b>	Sodium Citrate
	<b>Reference Interval</b>	10 – 14 seconds
	<b>Method</b>	Clot Detection
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Monitoring heparin therapy (unfractionated heparin [UFH]). Screening for certain coagulation factor deficiencies Detection of coagulation inhibitors such as lupus anticoagulant, specific factor inhibitors & non-specific inhibitors.
118	<b>Test</b>	<b>Prostate specific Antigen</b>
	<b>Specimen Required</b>	3ml plain blood
		Draw blood before rectal examination or biopsy procedure. Send specimen to the laboratory immediately
	<b>Reference Interval</b>	<4.0 ng/ml
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Tumour marker for prostate cancer. Increased levels seen in BPH & prostatitis

119	<b>Test</b>	<b>Reticulocyte Count</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	Adults and children : 0.5-2.5%
	<b>Method</b>	Manual Brilliant Cresyl Blue Stain
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Indication of degree of erythropoietic activity
120	<b>Test</b>	<b>Rubella IgG</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-Reactive < 5 IU/ml Gray Zone 5.0 -9.9 Reactive ≥ 10 IU/ml
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily
	<b>Medical Indication</b>	A "reactive " results suggest a current or previous exposure or immunization to Rubella
121	<b>Test</b>	<b>Rubella IgM</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-Reactive
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	2-3 days
	<b>Medical Indication</b>	A "reactive " results suggest a current or recent exposure to Rubella
122	<b>Test</b>	<b>Rheumatoid Factor (RF)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	<30 IU/mL
	<b>Method</b>	Immunoturbidimetry
	<b>Turnaround Time</b>	Daily
	<b>Medical Indication</b>	Supports diagnosis of Rheumatoid arthritis.
123	<b>Test</b>	<b>Sex Hormone Binding Globulin (SHBG)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 11.2 -78.1 nmol/L Female (Non-pregnant) : 11.7 – 137.2 nmol/L
	<b>Method</b>	Electrochemiluminescence Immunoassay
	<b>Turnaround Time</b>	1 Week
	<b>Medical Indication</b>	Useful in investigation of hirsutism and virilisation in females
124	<b>Test</b>	<b>Seminal Analysis</b>
	<b>Specimen Required</b>	Semen

	<b>Reference Interval</b>	Amount : 2-5 ml Colour : Greyish/Opaque white PH : Alkaline ( 7.2-8.5) Motility : Within 2 hours ejaculation, 60 % are vigorously motile & show progressive activity Morphology : 75 % -80 % normal sperms Liquefaction time: Less than 60 minutes
	<b>Method</b>	Direct measure/Observation/Microscopic examination
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluate Male fertility
125	<b>Test</b>	<b>Sodium</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	135 - 145 mmol/L
	<b>Method</b>	I.S.E. Indirect Potentiometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluation /assessment of electrolyte balance. Important in assessing acid-base balance, water balance, water intoxication & dehydration
126	<b>Test</b>	<b>Sodium (Urine)</b>
	<b>Specimen Required</b>	24 hour urine
	<b>Reference Interval</b>	30-300 mmol/24 hours
	<b>Method</b>	I.S.E Indirect Potentiometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessing acid-base balance, water balance, water intoxication and dehydration. Evaluation & assessment of electrolyte balance
127	<b>Test</b>	<b>Stone Analysis (Calculi)</b>
	<b>Specimen Required</b>	Stone/Calculi
	<b>Reference Interval</b>	Report indicates presence or absence of calcium, phosphate, oxalate, uric acid, carbonate, magnesium & ammonia
	<b>Method</b>	Biochemical tests
	<b>Turnaround Time</b>	4-5 days
	<b>Medical Indication</b>	Management of patients with recurrent renal calculi.
128	<b>Test</b>	<b>Testosterone</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male 142.39 – 923.14 ng/dl Female 10.83 – 56.94 ng/dl
	<b>Method</b>	Chemiluminescence immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnosis of hypogonadism in males, investigation of hirsutism & virilisation in females

129	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b>	<b>Triiodothyronine (T3)</b> 3ml plain blood 0.58 – 1.59 ng/mL Chemiluminescence immunoassay Daily, 24 hours
130	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Thyroid Stimulating Hormone (TSH)</b> 3ml plain blood Adult        0.35 – 4.94 uIU/L Newborn    0.68 – 28.60 uIU/L Chemiluminescence immunoassay Daily, 24 hours Diagnosis hyperthyroidism & hypothyroidism. Monitor thyroxine replacement or suppression therapy. Distinguish non-thyroidal illness (NT) from hyperthyroidism
131	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Thyroxine (T4)</b> 3ml plain blood Adult    4.87 – 11.72 µg/dl Newbo   8.50 – 22.0 µg/dl rn Chemiluminescence immunoassay Daily Diagnosis hyperthyroidism & hypothyroidism.
132	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Total Iron Binding Capacity (TIBC)</b> 3ml plain blood Male : 134 - 415 µg/dL, Female : 120 - 480 µg/dL Spectrophotometrically Daily, 24 hours Screening for chronic iron overload disease, particularly hereditary hemochromatosis. Diagnosis of iron deficiency. Evaluate red cell production & destruction, iron metabolism or iron transport.
133	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b> <b>Method</b> <b>Turnaround Time</b> <b>Medical Indication</b>	<b>Total RBC</b> 3ml EDTA blood Male : RBC : 4.5 - 6.0 M/cmm        Female : RBC : 4.0 - 5.5 M/cmm Light Scattering Flow Cytometry Daily, 24 hours Assess general health of an individual, screening for haematological disorders, infection
134	<b>Test</b> <b>Specimen Required</b> <b>Reference Interval</b>	<b>Total White &amp; Differential Count</b> 3ml EDTA blood WBC : 4,000 - 11,000 /cmm



		Polymorph : 50 - 70 % Lymphocytes : 20 - 40 % Monocytes : <10 % Eosinophils : <4 % Basophils : <1 %
	<b>Method</b>	Light Scattering Flow Cytometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders, infection
135	<b>Test</b>	<b>Total WBC</b>
	<b>Specimen Required</b>	3ml EDTA blood
	<b>Reference Interval</b>	WBC : 4,000 - 11,000 /cmm
	<b>Method</b>	Light Scattering Flow Cytometry
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assess general health of an individual, screening for haematological disorders, infection.
136	<b>Test</b>	<b>Human Chorionic Gonadotropin (hCG) Total β HCG</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-pregnant: ≤5.00 mIU/mL Weeks Post LMP 1 – 10 : <1.20 – 417, 430 mIU/mL 11 – 15 : 16,996 – 247,465 mIU/mL 16 – 22 : 6,860 – 50,239 mIU/mL 23 – 40 : 1,583 – 65,911 mIU/mL
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Tumour marker for hydatiform mole, choriocarcinoma & testicular cancer
137	<b>Test</b>	<b>Toxoplasma IgG</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	<0.90 Negative, 0.90-0.99 Equivocal, ≥1.00 Positive
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	1 Week
	<b>Medical Indication</b>	A "reactive" results suggests past toxoplasma infection.
138	<b>Test</b>	<b>Toxoplasma IgM</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	<0.90 Negative, 0.90-0.99 Equivocal, ≥1.00 Positive
	<b>Method</b>	Chemiluminescence Immunoassay
	<b>Turnaround Time</b>	1 Week
	<b>Medical Indication</b>	A "reactive" results suggests recent or current infections




139	<b>Test</b>	<b>Transferrin</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male: 92 – 286 mg/dl Female : 83 – 330 mg/dl
	<b>Method</b>	Calculated from Iron and TIBC
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Differential diagnosis of anaemia. Decreased levels seen in protein-calorie malnutrition, liver dysfunction & acute inflammation. Screening for chronic iron overload diseases, particularly hereditary hemochromatosis.
140	<b>Test</b>	<b>Troponin I</b>
	<b>Specimen Required</b>	3ml lithium heparin or EDTA blood
	<b>Reference Interval</b>	Positive/Negative
	<b>Method</b>	Rapid one - step Chromatographic Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Marker of myocardial injury. Exclusion diagnosis of acute myocardial infarction
141	<b>Test</b>	<b>Triglycerides</b>
	<b>Specimen Required</b>	3ml plain blood (fasting)
	<b>Reference Interval</b>	< 150 mg/dL
	<b>Method</b>	Enzymatic Colourimetric
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Evaluation of risk factors in individuals with elevated cholesterol values. Risk factor for acute pancreatitis & coronary heart disease
142	<b>Test</b>	<b>T-Uptake</b>
	<b>Specimen Required</b>	3ml Plain blood
	<b>Reference Interval</b>	0.69 – 1.41 T-Uptake units
	<b>Method</b>	Chemiluminescent microparticles Immunoassay
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessment of Thyroid function Status
143	<b>Test</b>	<b>Urea</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male: 19-44 mg/dl (<50 years), 18-55 mg/dl (>50 years) Female : 18 -55 mg/dl (<50 years), 21 – 43 mg/dl (>50 years)
	<b>Method</b>	Enzymatic GLDH/Urease
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening test for the evaluation of kidney function. Frequently requested with serum creatinine since determination of these 2 compounds aids in the differential diagnosis of pre-renal, renal & post-renal hyperuremia. Evaluate protein metabolism.
	<b>Test</b>	<b>Uric Acid</b>



144	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Male : 3.5 - 7.2 mg/dL , Female : 2.6 - 6.0 mg/dL
	<b>Method</b>	Uricase
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Diagnose gout & other disorders of uric acid. Diagnosis & treatment of renal failure & monitoring patients receiving cytotoxic drugs & a variety of other disorders including gout, leukemia, psoriasis, starvation & other wasting conditions.
145	<b>Test</b>	<b>Urea (Urine)</b>
	<b>Specimen Required</b>	24 hours urine (preservative 10ml concentrated HCL)
	<b>Reference Interval</b>	12 – 20 g/day (428 - 714 mmol/day)
	<b>Method</b>	Enzymatic GLDH/Urease
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Assessment of protein intake &/or nitrogen balance. Renal function test.
146	<b>Test</b>	<b>Urine FEME &amp; Specific Gravity</b>
	<b>Specimen Required</b>	20ml urine
	<b>Reference Interval</b>	pH, colour ,transparency, Specific Gravity, Positive/ Negative for Protein, Glucose, Ketone, Blood Microscopy for RBC, WBC, Epithelia Cells, casts, Bacteria & others
	<b>Method</b>	Urinalysis
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening for urinary tract diseases & some non-renal diseases
147	<b>Test</b>	<b>Urine :FEME &amp; Smear</b>
	<b>Specimen Required</b>	20ml urine
	<b>Reference Interval</b>	As in FEME & Specific Gravity, Microscopy reporting of gram stain.
	<b>Method</b>	Urinalysis and Conventional Gram Stain Procedure
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Presumptive diagnosis of bacterial infection. Stain is used to identify the presence of microorganisms
148	<b>Test</b>	<b>Urine : Microscopy</b>
	<b>Specimen Required</b>	20ml urine
	<b>Reference Interval</b>	Microscopy for RBC, WBC, Epithelial cells, casts, Bacteria & others
	<b>Method</b>	Urinalysis
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening for urinary tract diseases and some non-renal diseases
149	<b>Test</b>	<b>Urine : Specific Gravity</b>
	<b>Specimen Required</b>	20ml urine
	<b>Reference Interval</b>	1.010 - 1.030
	<b>Method</b>	Urinalysis

	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	As a partial assessment of the kidney's ability to concentrate urine
150	<b>Test</b>	<b>Varicella-Zoster IgG</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Not-Detected
	<b>Method</b>	Indirect Immunoenzyme assay
	<b>Turnaround Time</b>	1 Week
	<b>Medical Indication</b>	Detection of Antibody to Varicella Zoster Virus
151	<b>Test</b>	<b>Venereal Disease Research Laboratory (VDRL)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Non-Reactive
	<b>Method</b>	Manual Slide test
	<b>Turnaround Time</b>	Daily, 24 hours
	<b>Medical Indication</b>	Screening test for Syphilis
152	<b>Test</b>	<b>Vitamin B12</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	187 - 883 pg/mL
	<b>Method</b>	CMIA
	<b>Turnaround Time</b>	4 days
	<b>Medical Indication</b>	Investigation of macrocytic anemia. Workup of deficiencies seen in megaloblastic anemias. Diagnose pernicious anemia. Increased levels seen in hepatic cell damage & myeloid leukaemia
153	<b>Test</b>	<b>Widal Weil Felix (WWF)</b>
	<b>Specimen Required</b>	3ml plain blood
	<b>Reference Interval</b>	Negative
	<b>Method</b>	Tube Method
	<b>Turnaround Time</b>	1 day
	<b>Medical Indication</b>	Diagnosis of rickettsial Infections

## Appendix A: PATHOLOGY REQUEST FORMS

<p><b>B.P. CLUNIAL LAB. SDN. BHD.</b> (Malaysia)</p> <p><b>IRON LABORATORY</b>          1770, Jalan Mahalirajaperumal, Larkin, Kampong, 80400, Johor Bahru, Johor          Tel : 06-3300000, 06-3300000          Fax : 06-3300000, 06-3300000          Email: info@bpcunial.com          info@bpcunial.com</p>	<p><b>QUANTUM LABORATORY</b>          10, Jalan Permatang 2/10,          Dataran C.S. Nanyang, 80000, Johor Bahru,          80000 Johor, Johor Bahru          Tel : 06-3300000</p>	<p><b>CLUNIAL</b>          1770, Jalan Mahalirajaperumal, Larkin, Kampong, 80400, Johor Bahru, Johor          Tel : 06-3300000, 06-3300000          Fax : 06-3300000, 06-3300000          Email: info@bpcunial.com          info@bpcunial.com</p>
<p><b>PATHOLOGY REQUEST FORM</b></p>		
Patient's Name _____		Sex <input type="checkbox"/> Male <input type="checkbox"/> Female
DOB/Religion/Type _____		Date _____ Time _____
Nature of Specimen _____		R/H/Ls _____
Clinical note _____		Doctor's Signature & Clinic Stamp _____
Clinical Summary _____		LMP : _____
<p><b>ECHEMOLOGY</b></p> <p><input type="checkbox"/> Hemoglobin</p> <p><input type="checkbox"/> Alkaline Phosphatase</p> <p><input type="checkbox"/> Calcium</p> <p><input type="checkbox"/> Cholesterol, Total</p> <p><input type="checkbox"/> Creatinine</p> <p><input type="checkbox"/> Erythrocytes</p> <p><input type="checkbox"/> Globulin</p> <p><input type="checkbox"/> Glucose</p> <p><input type="checkbox"/> Hb A1c</p>	<p><b>HEMATOLOGY</b></p> <p><input type="checkbox"/> HbD &amp; Hb</p> <p><input type="checkbox"/> ESR</p> <p><input type="checkbox"/> Full Blood Count</p> <p><input type="checkbox"/> SPO2</p> <p><input type="checkbox"/> Hb</p> <p><input type="checkbox"/> Male to Female</p> <p><input type="checkbox"/> PCP</p> <p><input type="checkbox"/> Platelet Count</p> <p><input type="checkbox"/> TPOC</p> <p><input type="checkbox"/> TWOC</p>	<p><b>IMMUNOLOGY</b></p> <p><input type="checkbox"/> Rheumatoid Factor</p> <p><input type="checkbox"/> Tuberculin</p> <p><input type="checkbox"/> HIV</p> <p><input type="checkbox"/> HIV-1 &amp; HIV-2</p> <p><input type="checkbox"/> HIV-1 &amp; HIV-2</p>
<p><b>IMMUNOLOGY</b></p> <p><input type="checkbox"/> AFP</p> <p><input type="checkbox"/> Anti-HAV IgG</p> <p><input type="checkbox"/> Anti-HBc</p> <p><input type="checkbox"/> Anti-HBe</p> <p><input type="checkbox"/> Anti-HCV</p> <p><input type="checkbox"/> Anti-HIV-1 &amp; 2</p> <p><input type="checkbox"/> CK-MB</p>	<p><input type="checkbox"/> CA-15-2</p> <p><input type="checkbox"/> CA-18-9</p> <p><input type="checkbox"/> CEA</p> <p><input type="checkbox"/> PSA</p> <p><input type="checkbox"/> HbA1c</p> <p><input type="checkbox"/> HbA1c</p> <p><input type="checkbox"/> HbA1c</p> <p><input type="checkbox"/> HbA1c</p>	<p><b>IMMUNOLOGY</b></p> <p><input type="checkbox"/> Anti-HAV IgG</p> <p><input type="checkbox"/> Anti-HBc</p> <p><input type="checkbox"/> Anti-HBe</p> <p><input type="checkbox"/> Anti-HCV</p> <p><input type="checkbox"/> Anti-HIV-1 &amp; 2</p> <p><input type="checkbox"/> CK-MB</p>
<p><b>DIAGNOSTIC PROFILE</b></p> <p><input type="checkbox"/> Antinuclear Ab / F</p> <p><input type="checkbox"/> Aspartate Aminotransferase</p> <p><input type="checkbox"/> Creatinine</p> <p><input type="checkbox"/> Dequar Fever Studies</p> <p><input type="checkbox"/> Dequar Fever Studies</p>		
<p><b>ADDITIONAL TEST (Please tick)</b></p> <p><input type="checkbox"/> AFP</p> <p><input type="checkbox"/> Anti-HAV IgG</p> <p><input type="checkbox"/> Anti-HBc</p> <p><input type="checkbox"/> Anti-HBe</p> <p><input type="checkbox"/> Anti-HCV</p> <p><input type="checkbox"/> Anti-HIV-1 &amp; 2</p> <p><input type="checkbox"/> CK-MB</p>		
<p><b>FOR INTERNAL USE ONLY</b></p> <p><input type="checkbox"/> Patient <input type="checkbox"/> Physician <input type="checkbox"/> Lab <input type="checkbox"/> Other</p>		
<p><b>REMARKS</b></p> <p>BP 180</p> <p>BP 180</p> <p>BP 180</p> <p>BP 180</p> <p>BP 180</p>		

 <p><b>B.P.</b> BLOOD PRESSURE</p>	<p><b>B.P. MEDICAL LAB. SDN. BHD.</b> (Company No: 152314-4)</p> <p><b>IPOM LABORATORY</b> 1718, Jalan Raja Permaisuri Bainun (Luar Komplek) 30000 Ipoh, Perak. Tel : 05-5555955, 05-5619484 Fax : 05-5543884, 05-5619306 Email: info@bpmhealthcare.com URL: ipomlabhealthcare.com</p>	 <p>Timed Seal 100% GUARANTEE 100% ACCURATE</p>	<p><b>GLENMARIE LABORATORY</b> Lot 2, Jalan Permatang 2/1, Section 13, Seremban 2, Bt. Seremban, 42100 Bt. Seremban, Selangor. Tel: 03-55555525 Fax: 03-55555527</p>	 <p>Timed Seal 100% GUARANTEE 100% ACCURATE</p>	<p>IFCI-OPD 1st</p>
<p><b>CLINICAL REQUEST FORM</b></p>		<p>Clinical Code: _____</p>			
<p>Patient's Name : _____ (IN BLOCK LETTERS)</p> <p>I.C. No. _____ Age _____ Sex _____</p> <p>Nature of Specimen _____</p> <p>Examination Required _____</p> <p>Date _____ Time _____ am/pm</p> <p>Doctor's Signature _____ &amp; Clinic Stamp: _____</p>		<p>LAB. NO : _____</p> <p><input type="checkbox"/> Please phone results: Tel No : _____</p> <p><input type="checkbox"/> Please bill clinic.</p> <p><input type="checkbox"/> Please collect directly.</p> <p><input type="checkbox"/> Fasting</p> <p><input type="checkbox"/> Random</p>			

 <b>B.P. CLINICAL LAB. SDN. BHD.</b> (2024045) <b>PRO-LABORATORY</b> 21/22, Jalan Permatang Pauh, Jalan Permatang Pauh, 14000 Bukit Mertajam, Pulau Pinang. Tel: 04-26100000 Email: info@bpclinlab.com www.bpclinlab.com		<b>GENESEE LABORATORY</b> 10, Jalan Permatang Pauh, 14000 Bukit Mertajam, Pulau Pinang. Tel: 04-26100000 Email: info@bpclinlab.com www.bpclinlab.com
<h2 style="margin: 0;">CYTOLOGY Request Form</h2>		
I. Patient's Name : _____  II. I.C. No. : _____  III. Age : _____ IV. Ethnicity : _____  <b>Billing Information</b> <input type="checkbox"/> Please Bill Clinic <input type="checkbox"/> Please collect from patient	Lab. No. : _____  <input type="checkbox"/> Please phone results. Tel. No. : _____  Doctor's Name & Clinic Stamp : _____  _____ _____	
<b>SCREENING INFORMATION</b> (if where appropriate)		
Date sample taken : _____  <b>Sample site:</b> <input type="checkbox"/> Vaginal <input type="checkbox"/> Cervical Scrapes <input type="checkbox"/> Endocervical Swab <input type="checkbox"/> Sputum <input type="checkbox"/> Pleural / Ascitic Fluid <input type="checkbox"/> Buccal Smear <input type="checkbox"/> Others : _____	<b>Examination Required</b> <input type="checkbox"/> Conventional PAP Smear <input type="checkbox"/> Liquid-based preparation <input type="checkbox"/> HPV (dot) <input type="checkbox"/> Cytology for malignant cells	Time : _____  Previous cytology No. : _____  Place of previous screening : _____ _____ Previous Diagnosis : _____ _____

**CLINICAL SUMMARY:**

**CLINICAL SUMMARY** (S) where appropriate

hormonal status	Symptoms of:	Clinical Examination	Treatment History
<input type="checkbox"/> Pregnant	<input type="checkbox"/> Leucorrhoea / Pruritis	<input type="checkbox"/> Normal	<input type="checkbox"/> Chemotherapy
<input type="checkbox"/> Postpartum	<input type="checkbox"/> Abnormal Discharge	<input type="checkbox"/> Erosion	<input type="checkbox"/> Pelvic Radiation
<input type="checkbox"/> Pre-menopausal	<input type="checkbox"/> Colitis / Contact Bleeding	<input type="checkbox"/> Cervicitis	<input type="checkbox"/> Gynaecology Surgery
<input type="checkbox"/> Menopausal	<input type="checkbox"/> Monilia	<input type="checkbox"/> Polyp	<input type="checkbox"/> None
	<input type="checkbox"/> Trichomonas	<input type="checkbox"/> Malignant	
	<input type="checkbox"/> Senile Vaginitis	<input type="checkbox"/> Caustic	

Last menstrual period: .....  
 Contraceptive / hormonal therapy  
☐ IUCD  
☐ Hormonal  
 Specific: .....  
☐ None

Other relevant history  
 .....  
 .....  
 .....

[illegible]