# Ethiopian Public Health Institute
# National HIV Reference Laboratory

## Laboratory Hand Book

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REVISION AND AMENDMENT

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**Acknowledgement**

The Ethiopian Public Health Institute National HIV Reference Laboratory would like to acknowledge the technical expertise, quality team and the management for their active participation and dedication in the development of this handbook.

## Table of Contents

**Contact Information and Service Hours**

| Location | Contact address | Responsible person |
|---|---|---|
| Clinical Chemistry Laboratory | 0112758328 | Mr. Kissi Mudie |
| Reception | 0112133574 | Mr. Asmamaw |
| HIV Molecular lab | | Mrs. Kidist Zealiyas |
| Immunology and Haematology | 0112305050 | Mr. G/medhin G/micael |
| National HIV Reference Laboratory Office | 0112788057/58 | Mr. Atsbeha/Dr. Desta |

**Service Hours:** Laboratories are open for 24 hours (from Monday to Sunday) including holidays.

The address of NHIVRL is clearly written as:

**Address**

**Name of Laboratory: Ethiopian Public Health Institute**

**National HIV Reference Laboratory**

**Location: Gullele Sub city Arbegnoch Street**

**EPHI compound HIV building # 3**

**P.O.Box: 1242/5654**

**Phone No:-+251-11 -2 788057/58**

**Fax No: - +251-11-2-78-04-31**

**Email: NHIVRL@ethionet.et**

**Website: www.ephi.gov.et**

**Addis Ababa, Ethiopia**

**Vision and Mission of NHIVRL**

**Vision**

- To be center of Excellency in HIV research and laboratory diagnostic services in Africa.

**Mission**

- To provide quality, reliable and cost effective diagnostic services in Molecular, Immunology & hematology and Clinical Chemistry services to our customers.
- To conduct HIV and HIV related research and surveillance activities.
- To provide technical support to regional laboratories and health facilities.
- To provide training on research, surveillance and diagnostic services.
- To provide National EQA program to regional laboratories and federal hospitals.
- To provide advisory service to our customers.

**Background**

Since its inception about 70 years ago, the present Institute (Ethiopia Public Health Institute) has contributed a lot for the improvement of public health and nutrition problems of the country in different names and organizational structures. Based on health and nutrition priority areas, the Institute had been setting different strategies at different times to address the public health problem. Currently the Institute is focusing on priority disease research and strengthening the national public health laboratory services in the country. Moreover, the main target area of National Human Immuno Deficiency Virus Reference laboratory (NHIVRL) is conducting HIV surveillance, Research, Capacity building, clinical chemistry test, Immunology & Hematological activities and advanced molecular techniques.

Ethiopian Public Health Institute National HIV Reference Laboratory is responsible for the provision of high level diagnostic laboratory testing services for patients and specimens referred from all Regional and Federal Health facilities. In addition to being the largest clinical laboratory it provides specialized testing and diagnostic consultation for the entire country. The NHIVRL demonstrates and provides leadership and support to:

- Standardize integrated laboratory services for the national laboratory system
- Improve the capacity of the Regional/Federal Laboratories
- Expand and strengthen the External Quality Assessment Programs
- Expand and strengthen standardized training programs for laboratory personnel and other health care `workers
- Improve the management of equipment service and maintenance.
- Develop a Laboratory networking and implementation of an LIS system

This handbook provides information on services offered, quality assurance, laboratory operations, sample collection, transport and agreed turnaround times for end customers.

Scope of the Handbook

This handbook provides a high quality laboratory services and information on how to request laboratory tests of NHIVRL to the health providers and customers.

**Definition of Terms**

**Test:** The intended analysis type required to be analyzed

**Patient preparation**: The requirements that the patient has to do before sample collection.

**Specimen**: Biological material which is obtained in order to detect or to measure one or more quantities

**Sample**: One or more parts taken from a system and intended to provide information on the system.

**Container:** The appropriate means of holding the sample for storage and transportation.

**Specimen volume**: The adequate amount of sample required to successfully complete the test.

**Transport conditions:** The required conditions for transporting the sample. Example, at room temperature, refrigerated, screw caped, triple packed… etc.

**Storage condition and stability**: The viability and /or integrity of the desired analyte with specified storage temperature for a limited period of time.

Test Requisition: A complete request for the specific test using a standardized request form with all required data for the testing process.

**Turn Around Time (TAT):** The duration from the time of receipt of the sample at the reception to the time of report delivery to the patient, clinician or referring laboratory.

**Reference Range:** The clinically acceptable range of a certain analyte for the target population.

**Method**: The analytical procedure that is used to conduct the test and detect the analyte.

**Panic values:** Interval of examination results for an alert (critical) test that indicates an immediate risk to the patient of injury or death

## Test Requisition and Result Reporting

Test services provides to the customers who come with complete request forms from authorized Health facilities. Service can also be provided for collected samples with appropriate package, transport temperature and complete, appropriate request forms. All services are charged and free services should be accompanied with support letters from appropriate government body.

Ordered tests are completed and reported according to the established TAT.

Results will be delivered to the customers through;

- Facility representatives (with regularly scheduled service hours)
- Short Message Services(SMS) from the reference laboratory to physician's office
- Directly to the customers
- Postal service

## Quality Assurance Programs

Quality assurance program is an integral part of daily operations at NHIVRL. The program is overseen and administered by qualified technical experts working for continual improvement of testing quality.

All tests provided are conducted after Quality control (QC) passed. QC is a system or process for monitoring the quality of laboratory testing performance.

All laboratories participate in External quality Assessment scheme, a tool to assess laboratory performances.

NHIVRL are also enrolled in ISO accreditation schemes which will assure quality of laboratory services provided.

**List of NHIVRL laboratory tests**

Laboratory tests provided by NHIVRL are:-

- Clinical chemistry tests
- Immunology and hematology tests
- HIV Molecular tests

**Clinical chemistry tests**

Liver function panel

**1. Alpha-Fetoprotein, AFP**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately on ice |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 3 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 5.8 U/ml (Including non-Pregnant women ) |
| **Turnaround time** | 48hrs |

**2. Albumin**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately on ice |
| **Storage** | Keep serum in refrigerator 2-8°c for 3 Days or store in freezer at -20°c temp. up to 6 months and indefinitely at -70°c |
| **Stability** | Serum is stable for less than 3 days at 2-8°c and 6 month at -20°c and at -70°c for indefinitely |
| **Method** | Photometric |
| **Reference range** | Adults 18-60 years …… 3.5-5.0 g/dl<br>Aged > 60years……3.4-4.8 g/dl<br>Children 4 days -14 years…3.8 -5.4 g/dl<br>Newborns 0-4 Days …….2.8-4.4 g/dl |
| **Turnaround time** | 48hrs |

**3. Alkaline Phosphatase ( ALP)**

| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately on ice |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 days or store in freezer at -20°c for up to 3 months |

| | |
|---|---|
| **Stability** | Serum is stable for 5 days at 2-8°c and for 3 month at -20°c |
| **Method** | Photometric |
| **Reference range** | Adults :40-129IU/l for Male and 35-104IU/l for Female<br>Aged 1 Days…… <250 U/L<br>Aged 2 Days ……<231 U/L<br>Aged 6 days -6 months…… <449 U/L<br>Age 7 months –1Year…….<462 U/L<br>Age 1-3 Years…… <281 U/L<br>Aged 4-6 years ……..<269 U/L<br>Aged 7-12 Years ……..<300U/L<br>Aged 13-17 Years(F)…..……<187 U/L<br>Aged 13-17 Years (M)…….<390U/L |
| **Turnaround time** | 48hrs |

**4. Alanine Aminotransferase, ALT/GPT**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately on ice. |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 days or 1day at 20-25°c |
| **Stability** | Serum is stable for 7 days at 2-8°c or 1day at 20-25°c |
| **Method** | Photometric |
| **Reference range** | Females up to 31 U/L<br>Male up to 41 U/L |
| **Turnaround time** | 48hrs |

**5. Asparate Aminotransferase/AST/GOT**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately on ice. |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or 1 days at room temperature |
| **Stability** | Serum is stable for 7 days at 2-8°c or 1 day at room temperature. |
| **Method** | Photometric |
| **Reference range** | Females up to 32 U/L<br>Males up to 38 U/L |
| **Turnaround time** | 48hrs |

**6. Bilirubin Total**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |

| | |
|---|---|
| **Transport** | Serum should be transported immediately. |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 6 month at -20°c |
| **Method** | Photometric |
| **Reference range** | Adults and Children …….<1.0mg/dl<br>Neonates premature (3-5D)….<15.0 mg/dl<br>Neonates premature (2D)…….<8mg/dl<br>Neonates premature (1D)…….< 6.0mg/dl<br>Neonates (3-5D)……..<12.0 mg/dl<br>Neonates (2D)……..….<7mg/dl<br>Neonates (1D)……...<6mg/dl |
| **Turnaround time** | 48hrs |

**7. Bilirubin Direct**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Serum is stable for 2 days at room temperature, 7 days at 2-8°c and for 6 month at -20°c |
| **Stability** | Serum is stable for 2 days at room temp. 2-8°c for 7 days or Store in at -20°c temp. for 6 months Protect Specimens from exposure to light. |
| **Method** | Photometric |
| **Reference range** | 0-0.2 mg/dl |
| **Turnaround time** | 48hrs |

**8. GGT**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | 2-8°c |
| **Stability** | Serum is stable for 7 days at 2-8°c and 7 days at room temperature 15-25°c,1year at (-15)-(-25°c) |
| **Method** | Enzymatic colorimetric assay |
| **Reference range** | Men: 8-61u/l<br>Women: 5-36 u/l |
| **Turnaround time** | 48hrs |

**9. LDH**

| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | 7 days at 15-25°c. 4 days at 2-8°c and for 6 weeks at -20°c |
| **Stability** | Serum is stable for 7 days at room temp. 2-8°c for 4 days or Store in at -20°c temp. For 6 weeks. LDH is affected by cooled and frozen samples. |
| **Method** | UV-assay |
| **Reference range** | 240-480u/l at 37°c |
| **Turnaround time** | 48hrs |

**Tumor Marker Panel**

**1. Carbohydrate Antigen 125, CA-125**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°ctemp. up to 3 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 3 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 35 U/L |
| **Turnaround time** | 48hr |

**2. Carbohydrate Antigen 15-3 ( CA-15-3)**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20 temp. up to 3 months |
| **Stability** | Serum is stable for 7 days at 2-8°c or 3 Months at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 25 U/ml |
| **Turnaround time** | 48hrs |

**3. Carbohydrate Antigen 19-9, CA-19-9**

| | |
|---|---|
| **Patientpreparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |

| | |
|---|---|
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 27 U/ml |
| **Turnaround time** | 48hr |

**4. Carcinoembryonic Antigen (CEA)**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 6 months. |
| **Stability** | Serum is stable for 7 days at 2-8°c or 3 Months at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 25 U/ml |
| **Turnaround time** | 48hr |

**5. Thyroglobulin, Tg**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 2-70 ng/ml |
| **Turnaround time** | 24 hr |

**6. CA72-4**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Serum is stable for 30 days at2-8°c ,3 months °c at -20°c |
| **Stability** | stable for 30 days at2-8°c ,3 months °c at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 5.6-8.2U/ml |

| | |
|---|---|
| **Turnaround time** | 48hrs |

### 7. Acid Phosphatase

| | |
|---|---|
| **patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Serum is stable for 8 days at room temp. 8 days at 2-8°c and for 4 month at -20°c |
| **Stability** | Serum is stable for 8 days at room temp. 2-8°c for 8 days or Store in at (-15)-(-20) °c temp. for 4 months<br>Protect Specimens from exposure to light. |
| **Method** | Colorimetric |
| **Reference range** | Men: < 6.6 U/L<br>Women:< 6.5 U/L |
| **Turnaround time** | 48hr |

### 8. Prostate-specific antigen Total, TPSA

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 5 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | |

| Age | Reference Range |
|---|---|
| <40 | Up to 1.4 |
| 40-50 | Up to 2.0 |
| 50-60 | Up to 3.1 |
| 60-70 | Up to 4.1 |
| >70 | Up to 4.4 |

| | |
|---|---|
| **Turnaround time** | 24 hr |

### 9. Prostate-Specific Antigen Free, FPSA

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or store in freezer at -20°c temp. up to 6 months |

| | |
|---|---|
| **Stability** | Serum is stable for 5 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Not applicable<br>If Total PSA results between 4-10, uses free PSA to calculate % free PSA.<br>The ratio is useful when used in conjugation with the Elecsys total PSA tests as an aid in distinguishing Prostate Cancer from being Prostatic conditions in Male Age 50 years or older who have a digital examination that is not suspicious for prostate Cancer.<br>%FPSA= FPSA X 100<br>TPSA |
| **Turnaround time** | 24 hrs |

**10. Human Chorionic Gonadotropin (HCG-Beta), Beta Subunit**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 3 Days or store in freezer at -20°c temp. up to 12 months |
| **Stability** | Serum is stable for 3 days at 2-8°c and for 12 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 2.6 mIU/ml for Male,<br>up to 8.30 mIU/ml for postmenopausal women<br>Up to 5.3 mIU/ml for non-pregnant premenopausal women |
| **Turnaround time** | 72 hrs |

**Lipid Panel**

**1. Cholesterol, Total**

| | |
|---|---|
| **Patient preparation** | Fasting for 12 hours is required prior to the test. Water is permitted. No alcohol is allowed for 24 hours prior to the test. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for5- 7 Days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 5- 7 days at 2-8°c and for 3 month at -20°c |
| **Method** | Photometric |
| **Reference range** | |

Clinical Interpretations according to the recommendations of the European Atherosclerosis Society *

| | mmol/l | mg/dl | Lipid metabolism disorder |
|---|---|---|---|
| Cholesterol | <5.2 | <200 | NO |
| Triglycerides | <2.3 | <200 | |

| | | | |
|---|---|---|---|
| Cholesterol | 5.2-7.8 | 200-300 | YES, if HDL-Cholesterol <0.9 mmol/l (<35mg/dl) |
| Cholesterol<br>Triglycerides | >7.8<br>>2.3 | >300<br>>200 | Yes |

| | |
|---|---|
| **Turnaround time** | 48hrs |

**1. High-density lipoprotein, HDL**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -70°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -70°c |
| **Method** | Electrochemiluminescence immunoassay |

**Reference range**

| | No risk | Moderate risk | High risk |
|---|---|---|---|
| Females | >65 mg/dl | 45-65 mg/dl | <45 mg/dl |
| Males | >55 mg/dl | 35-55 mg/dl | <35 mg/dl |

| | |
|---|---|
| **Turnaround time** | 24 hrs |

**2. LDL**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -70°c temp. up to 12 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 12 month at -70°c |
| **Method** | colorimetric |

**Reference range**

| | optimal | Above optimal | Borderline high | High | Very high | Unit |
|---|---|---|---|---|---|---|
| adult | <100 | 100-129 | 130-159 | 160-189 | ≥ 190 | mg/dl |

| | |
|---|---|
| **Turnaround time** | 24 hrs |

**3. Triglycerides**

| | |
|---|---|
| **Patient preparation** | **Fasting is required for 12 hours before the test. Water intake is allowed.** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7 days 2-8°c or |

| | |
|---|---|
| | 3 months at -20°c temp. or several years at -70°c |
| **Stability** | Serum is stable for 7 days at at 2-8°c , for 6 month at -20°c and several years at -70°c |
| **Method** | Photometric |
| **Reference range** | Clinical interpretations according to the recommendations of the European Atherosclerosis Society. |

| | mg/dl | Lipid metabolism disorder |
|---|---|---|
| Cholesterol<br>Triglycerides | <200<br><200 | No |
| Cholesterol | 200-300 | Yes, if HDL-Cholesterol <035 mg/dl |
| Cholesterol<br>Triglycerides | >300<br>>200 | Yes |

| | |
|---|---|
| **Turnaround time** | 24 hrs |

## Cardiac Panel

### 1. Creatine Kinase Total, CK

| | |
|---|---|
| **Patient preparation** | Do not administer any intramuscular injections for 1 hour prior to the test**.** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20 temp. up to 4 Weeks or at room temp. for 2 days |
| **Stability** | Serum is stable for 7 days at 2-8°c or 4 Weeks at -20°c or room temp. for 2 days |
| **Method** | Photometric |
| **Reference range** | Females …….26-192U/L<br>Males ……..39-308 U/L<br>Note<br>Myocardial infarction: There is a high probability of Myocardial damage when the following three conditions are fulfilled.<br>1. CK Men……..>190U/L<br>2. CK Women……>167U/L<br>3. CK-MB……..>24 U/L<br>The CK-MB activity accounts for 6-25% of the total CK activity. |
| **Turnaround time** | 2 hours |

### 2. Creatine Kinase (CK), MB

| | |
|---|---|
| **Patient preparation** | Inform the patient that this test is often performed on three consecutive days, and again in one week, necessitating multiple Venipuncture. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or room temp. for only 2 hours. |
| **Stability** | Serum is stable for 5 days at 2-8°c and for or room temp. for only 2 hours. |
| **Method** | Photometric |
| **Reference range** | Reference rang 7-25U/L<br>Note |

| | |
|---|---|
| | Myocardial infarction: There is a high probability of Myocardial damage when the following three conditions are fulfilled.<br>1. CK Men……..>190U/L<br>2. CK Women……>167U/L<br>3. CK-MB……..>24 U/L<br>The CK-MB activity accounts for 6-25% of the total CK activity |
| **Turnaround time** | 2 hrs |

**3. Troponin T hs STAT**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7 days at 2-8°c<br>3 months at -20°c temp. or several years at -70°c |
| **Stability** | Stable for24 hrs at 2-8°c, 12 month at -20°c freeze only once. |
| **Method** | Immunoassay |
| **Reference range** | 0-14pg/ml |
| **Turnaround time** | 24 hrs |

**4. D-Dimer**

| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7 days at 2-8°c<br>3 months at -20°c temp. or several years at -70°c |
| **Stability** | Stable for 8 hrs at room temp. 4 days at 2-8°c, 6 month at(-15)- (-25)°c |
| **Method** | Immunoturbidimetric assay |
| **Reference range** | < 0.5 µg /U/mL |
| **Turnaround time** | 24 hrs |

**5. CRP hs**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Stable for 11days at 15-25°c. 2 months at 2-8°c, 3years at(-15)- (-25)°c |
| **Stability** | Stable for 11days at 15-25°c. 2 months at 2-8°c, 3years at(-15)- (-25)°c |
| **Method** | Turbidimetric assay |
| **Reference range** | mg/dL mg/L nmol/L |

| | | | |
|---|---|---|---|
| | < 0.5 | < 5.0 | < 47.6 |
| **Turnaround time** | 24 hrs | | |

**Renal function panel**

**1. Creatinine**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum at room temperature for 7 days, or 7 days at 2-8°c or 3months at -20°c temp. |
| **Stability** | Serum is stable for 7 days at room temp. 2-8°c for 7 days or Store in at -20°c temp. for 3 months |
| **Method** | Photometric |
| **Reference range** | Adult Females ……0.50- 0.90 mg/dl<br>Adult Males ……0.70-1.20mg/dl<br>Children<br>Neonates (Premature) …0.29-1.04mg/dl<br>Neonates (Full term) …0.24- 0.85mg/dl<br>2-12 M……0.17-0.42mg/dl<br>1-<3Y……0.24-0.41mg/dl<br>3-<5Y……0.31-0.47mg/dl<br>5-<7Y……0.32-0.59mg/dl<br>7-<9Y……0.40-0.60mg/dl<br>9-<11Y……0.39-0.73mg/dl<br>11-<13Y……0.53-0.79mg/dl<br>13-<15Y……0.57-0.87mg/dl |
| **Turnaround time** | 24 hrs |

**2. Total Protein**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 3 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 6 month at -20°c |
| **Method** | Photometric |
| **Reference range** | Adults(ambulatory)……..…6.4-8.3g/dl<br>>3years……...6.0-8.0g/dl<br>1-2 years……....5.6-7.5g/dl<br>7 months-1years……..5.1-7.3g/dl<br>1 week ……4.4-7.6g/dl<br>Newborn ……4.6-7.0g/dl<br>Premature……..3.6-6.0g/dl<br>Umbilical cord ……4.8-8.0 g/dl |
| **Turnaround time** | 24 hrs |

| **3. Cystatin C** | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | |
| **Stability** | Serum is stable for 7 days at 4 ° C[25,26]. 7 days at (-20)-(-25) °c, 24 months at -25°c. |
| **Method** | Immunoturbidimetric assay |
| **Reference range** | |
| **Turnaround time** | 24 hrs |

| **4. Potassium, K+** | |
|---|---|
| **Patient preparatio** | **Not necessary** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Ion selective Method |
| **Reference range** | 3.5 – 5.1 mmol/l |
| **Turnaround time** | 24 hrs |

| **5. Uric Acid** | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 5 days 2-8°c at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 5 days at 2-8°c and for 6 month at -20°c |
| **Method** | Photometric |
| **Reference range** | Females ……..<5.7md/dl<br>Males (≤65years)…..<7.0mg/dl<br>Females(≥65years)….<8.4 mg/dl |
| **Turnaround time** | 24 hrs |

| **6. Urea/BUN** | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7 days at room temperature, or 7 days at 2-8°c or 1 year at -20°c. |

| | |
|---|---|
| **Stability** | Serum is stable for 7 days at room temperature, or 7 days at 2-8°c or 1 year at -20°c. |
| **Method** | Photometric |
| **Reference range** | 10-50 mg/dl<br>Conversion Factors from Urea to Bun<br>*mg/dl urea X 0.467= mg/dl urea nitrogen* |
| **Turnaround time** | 24 hrs |

**Anemia Panel**

1. Ferritin

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Males ……ng/ml<br>Females……ng/ml |
| **Turnaround time** | 72hrs |

2. **Transferrin**

| | |
|---|---|
| **Patient preparation** | Fasting is required for 12 hours before the test. Water intake is allowed. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7 days at room temp. or 7 days at 2-8°c or in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 7 days at room temp.,7 days at 2-8°c and for 6 month at -20°c |
| **Method** | Immunoturbidimeteric assay |
| **Reference range** | 2.0-3.6g/L |
| **Turnaround time** | 24hrs |

**2 Folate, Serum**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum at room temperature for 2 hours, in refrigerator at 2-8°c for days or store in freezer at -20 temp. up to 1 months |
| **Stability** | Serum is stable for 2 hours at room temp. 2-8°c for 2 days and 1 Months at20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 0.640-20.0 ng/ml |
| **Turnaround time** | 72hrs |

3. **Vitamin B12 OR Cyanocobalamin**

| | |
|---|---|
| **Patient preparation** | Fasting specimen preferred; must draw before Schilling's test, transfusions or B12 therapy is started. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 2 days 2-8°c, 2 months at -20°c temp. freeze once only. |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 2 month at -20°c. |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 197-866 pg/ml |
| **Turnaround time** | 72hrs |

**4. Iron**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8 ºC . |
| **Storage** | Keep serum for 2 days 2-8°c, 2 months at -20°c temp. freeze once only |
| **Stability** | 7 days at 15‑25 °C,3 weeks at 2‑8 °C, several years at (-15)‑(-25) °C |
| **Method** | Colorimetric assay |
| **Reference range** | 5.83‑34.5 µmol/L (33‑193 µg/dL) |
| **Turnaround time** | 24 hrs |

**Thyroid Function panel**

**1. Triiodothyronine, T3**

| | |
|---|---|
| **Patient preparation** | Fasting for 8 to 10 hours is required before the test. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 15 – 65 pg/ml |
| **Turnaround time** | 24 hrs |

**2. Thyroxin, T4**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |

| | |
|---|---|
| **Reference range** | 5.1 – 14.1 µg/dl |
| **Turnaround time** | 24hrs |

**3. Free Triiodothyronine, FT3**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 2.0- 4.4 pg/dl |
| **Turnaround time** | 48hrs |

**4. Thyroxin Free, FT4**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 0.93 -1.70 ng/dl |
| **Turnaround time** | 48hrs |

**5. Thyroid-stimulating hormone, TSH**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 7days 2-8°c at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Adults ……..0.27- 4.2 µIU/ml |
| **Turnaround time** | 24 hrs |

**6. Anti-TPO**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |

| | |
|---|---|
| **Storage** | Keep serum for 3days 2-8°c at -20°c temp. up to 1 months |
| **Stability** | Stable for 3 days at 2‑8 °C, at least 1 month at -20 °C. Freeze only once |
| **Method** | Immunoassay |
| **Reference range** | 2-34 IU/ML |
| **Turnaround time** | 24 hrs |
| **7. Anti-TG** | |
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 3days 2-8°c at -20°c temp. up to 1 months |
| **Stability** | Stable for 3 days at 2‑8 °C, at least 1 month at -20 °C. Freeze only once |
| **Method** | Immunoassay |
| **Reference range** | 115 IU/ML |
| **Turnaround time** | 24 hrs |
| **8. Anti-TSHR** | |
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 3days 2-8°c at -20°c temp. up to 1 months |
| **Stability** | Stable for 3 days at 2‑8 °C, at least 1 month at -20 °C. Freeze only once |
| **Method** | Immunoassay |
| **Reference range** | 0-1.75IU/L |
| **Turnaround time** | 24 hrs |
| **9. Parathyroid Hormone, PTH, Parathormone** | |
| **Patient preparation** | Fasting for 8 to 10 hours is required before the test. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 15 – 65 pg/ml |
| **Turnaround time** | 72hrs |
| **10. T- Uptake** | |
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |

| | |
|---|---|
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 8 hours at room temperature or up to 48 hours at 2-8°c or longer period of time at -20°c or below |
| **Stability** | Serum is stable for 8 hours at room temperature, 48 hours 2-8°c, d longer period of time at -20°c or below |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | |
| **Turnaround time** | 24 hrs |

**Electrolyte Panel**

**1. Potassium, K+**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Ion selective Method |
| **Reference range** | 3.5 – 5.1 mmol/l |
| **Turnaround time** | 24hrs |

**2. Chloride**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 48 hrs at room temp. 2-8°c for 7 days or Store in freezer at or 4 Weeks at -20°c temp. up to 1 months |
| **Method** | Ion selective method (ISE) |
| **Reference range** | 97 – 111 mmol/l |
| **Turnaround time** | 48hrs |

**3. Sodium, Na+**

| | |
|---|---|
| **Patient Preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 48 hours at room temp. 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Ion selective Method |

| | |
|---|---|
| **Reference range** | 136 – 145mmol/l |
| **Turnaround time** | 24 hr |

**Infertility Panel**

**1 Follicle-Stimulating Hormone, FSH**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 14 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 14 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Follicular 3.5-12.5<br>Ovulation 4.7-21.5<br>Luteal 1.7-7.7<br>Postmenopause 25.8-134.8<br>Men 1.24–7.8 |
| **Turnaround time** | 12hrs |

**2. Luteinizing Hormone, LH**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Store at 2-8°c for 14 days or 6 months at -20°C |
| **Stability** | Serum is stable for 14 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |

**Reference range**

| *Reference Range* | | | | |
|---|---|---|---|---|
| *Male* | *Women* | | | |
| | *Follicular* | *Ovulation* | *Luteal* | *postmenopause* |
| *1.7-8.6* | *2.4-12.6* | *14.0-95.6* | *1.0-11.4* | *7.7-58.5* |

Note: for detail reference range please contact us.

| | |
|---|---|
| **Turnaround time** | 24 hrs |

**3. Prolactin, PRL**

| | |
|---|---|
| **Patient preparation** | No fasting is required prior to the test. The patient should rest 30 minutes prior to the test. The sample should be drawn in the morning. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 14 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 14 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |

| | |
|---|---|
| **Reference range** | Male 4.04-15.2 and Female 4.79-23.3<br>Note: For Detail age specific reference range please contact us or refer to patient result report |
| **Turnaround time** | 24 hrs |

**4. Progesterone, PROG**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 5 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Follicular 0.20 -1.5<br>Ovulation 0.80- 3.00<br>Luteal 1.7-27.0<br>Postmenopause 0.1-0.8<br>Men 0.2-1.4 |
| **Turnaround time** | 24 hrs |

**5. Estradiol, E2**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Stable for 2 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |

**Reference range**

| Male | Female | | | |
|---|---|---|---|---|
| | Follicular | Ovulation | Luteal | postmenopause |
| 7.63-42.6 | 12.5-166 | 85.8-498 | 43.8-211 | <5.00-54.7 |

1st trimester 215-4300pg/ml
Children(1-10 years)
Boys 5.0-20.0
Girls 6.0-27.0

| | |
|---|---|
| **Turnaround time** | 48hr |

**6. Testosterone**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |

| | |
|---|---|
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Reference Range |

| *Men* | *women* |
|---|---|
| 2.8 – 8.0 ng/ml | 0.06 – 0.82 ng/ml |
| *Boys* | |
| <1 year | 0.12 – 0.21 ng/ml |
| 1 – 6 years | 0.03 – 0.32 ng/ml |
| 7 – 12 years | 0.03 – 0.68 ng/ml |
| 13 – 17 years | 0.28 – 11.1 ng/ml |

Note: contact us for age specific reference range or see patient result report

| | |
|---|---|
| **Turnaround time** | 24 hrs |

**Metabolic Panel**

**1 Glucose, Fast Blood Sugar, FBS**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum at room temperature for 8hrs or 72 hrs at 2-8°c |
| **Stability** | Serum is stable at room temp. for 8 hrs and 72 hrs at 2-8°c. |
| **Method** | Photometric |
| **Reference range** | 55-115mg/dl<br>According to Tietz*<br>Adults……..70-105mg/dl<br>>60 years……80-115 mg/dl<br>>70 years……..83-115mg/dl<br>Children …….60-110mg/dl<br>Newborns(1Days)…….40-60mg/dl<br>Newborns (>1Days)…….50-80mg/dl |
| **Turnaround time** | 24 hrs |

**Insulin**

| | |
|---|---|
| **Patient preparation** | Fasting for 8 hours is required prior to the test. Water is permitted**.** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 6 month |

| | |
|---|---|
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 2.6 – 24.9 µU/mL |
| **Turnaround time** | 24 hrs |

**3 Calicum, Ca++**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or 1Months at -20°c |
| **Stability** | Serum is stable for 7 days at 2-8°c or 1Months at -20°c |
| **Method** | ion-selective electrode (ISE) |
| **Reference range** | 8.6-10.3 mg/dl or 2.15 to 2.56 mmol/l |
| **Turnaround time** | 48hrs |

**4 Fructosamine**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 3days at 15‑25 °C, 2-8°c for 2 weeks or 2 Months at (-15)‑(-25) °C |
| **Stability** | 3 days at 15‑25 °C,2 weeks at 2‑8 °C,2 months at (-15)‑(-25) °C |
| **Method** | Colorimetric assay |
| **Reference range** | 228-563µmol/L |
| **Turnaround time** | 48hrs |

**5 Vitamin D total**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum for 8 hrs at 18‑25 °C,4days at 2-8°c,24 weeks at-20 °C |
| **Stability** | Stable for 8 hrs at 18-25 °C, 4 days at 2‑8 °C,24 weeks at -20 °C |
| **Method** | Electrochemiluminescence |
| **Reference range** | Clinical assessment should be taken into consideration when interpreting results |
| **Turnaround time** | 48hrs |

**6 HbA1c**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Whole blood |

| | |
|---|---|
| **Container** | $K_2$,$K_3$, $Na_2$/ potassium fluoride EDTA ,Li heparin tube |
| **Volume** | 3-5 ml of whole blood |
| **Transport** | Whole should be transported immediately at room temperature. |
| **Storage** | Keep whole blood for 3days at 15-25 °C,7 days at 2-8°c,6 months at-20 °C |
| **Stability** | Stable for 3 days at 15-25 °C,7 days at 2-8°c,6 months at-20 °C |
| **Method** | Turbidimetric inhibition immunoassay |
| **Reference range** | 5.7%-6.4% risk of developing diabetes ,20%= poorly controlled diabetes, |
| **Turnaround time** | 72hrs |

**7 Mg**

| | | | |
|---|---|---|---|
| **Patient preparation** | Not necessary | | |
| **Sample Type** | Serum | | |
| **Container** | Red-Stopper tube or Serum-Separator tube | | |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood | | |
| **Transport** | Serum should be transported immediately 2-8c . | | |
| **Storage** | Keep serum for 8 hrs at 18-25 °C,4days at 2-8°c,24 weeks at-20 °C | | |
| **Stability** | Stable for 7 days at 15-25 °C,7 days at 2-8 °C,1 year at (-15)-(-25) °C | | |
| **Method** | Colorimetric endpoint method | | |
| **Reference range** | NewNewborn | 0.62-0.91 mmol/L | (1.5-2.2 mg/dL) |
| | 5 months-6 years | 0.70-0.95 mmol/L | (1.7-2.3 mg/dL) |
| | 6-12 years | 0.70-0.86 mmol/L | (1.7-2.1 mg/dL |
| | 12-20 years | 0.70-0.91 mmol/L | (1.7-2.2 mg/dL) |
| | Adults | 0.66-1.07 mmol/L | (1.6-2.6 mg/dL) |
| | 60-90 years | 0.66-0.99 mmol/L | (1.6-2.4 mg/dL) |
| | > 90 years | 0.70-0.95 mmol/L | (1.7-2.3 mg/dL) |
| **Turnaround time** | 48hr | | |

**8 Amylase**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | 7 Days at 20-25°c or 1 month at 2-8°c |
| **Stability** | Serum is stable for 7 Days at 20-25°c or 1 month at 2-8°c |
| **Method** | Photometric |
| **Reference range** | all age group 28-100U/L |
| **Turnaround time** | 48hrs |

**9 Cortisol**

| | |
|---|---|
| **Patient preparation** | Fasting and limited physical activity for 10 to 12 hours is required prior to the test. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 5 days at 2-8°c or -20°c for 3 months. |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 6.2 – 19.4 µg/dl (Morning Hours) and 2.3 – 11.9 µg/dl(Afternoon Hours) |
| **Turnaround time** | 48hrs |

**10 Cyfra 21-1**

| | |
|---|---|
| **Patient preparation** | Fasting and limited physical activity for 10 to 12 hours is required prior to the test**.** |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 5 Days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 5 days at 2-8°c or -20°c for 3 months. |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | Up to 2.2ng/ml |
| **Turnaround time** | 5 days |

**11 Dehydroepiandosteronesulphate, DHEA-S**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20° temp. up to 2 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 2 month at -20°c. |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | |

| | Female - Age (years) | Reference Range | Units |
|---|---|---|---|
| DHEA-S | 10- 14 | 33.9 – 280 | µg/dl |
| | 15- 19 | 65.1 – 368 | |
| | 20-24 | 148 – 407 | |
| | 25-34 | 98.8 – 340 | |
| | 35-44* | 60.9 – 337 | |

| | | | |
|---|---|---|---|
| | 45-54* | 35.4 – 256 | |
| | 55-64 | 18.9 – 205 | |
| | 65-74 | 9.40 – 246 | |
| | >75 | 12.0 – 154 | |
| | *Males* - Age (years) | | |
| | 10- 14 | 24.4 – 247 | |
| | 15- 19 | 70.2 – 492 | |
| | 20-24 | 211 – 492 | |
| | 25-34 | 160 – 449 | |
| | 35-44 | 88.9 – 427 | |
| | 45-54 | 44.3 – 331 | |
| | 55-64 | 51.7 – 295 | |
| | 65-74 | 33.6 – 249 | |
| | >75 | 16.2 – 123 | |
| | Children | | |
| | < 1 week | 108 – 697 | |
| | 1 – 4 weeks | 31.6 – 431 | |
| | 1 – 12 months | 3.4 – 124 | |
| | 1 – 4 years | 0.47 – 19.4 | |
| | 5 – 10 years | 2.8 – 85.2 | |

| | |
|---|---|
| **Turnaround time** | 72hrs |

**12 Digoxin**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 2 Days or store in freezer at -20°c temp. up to 6 months |
| **Stability** | Serum is stable for 2 days at 2-8°c and for 6 month at -20°c |
| **Method** | Electrochemiluminescence immunoassay |
| **Reference range** | 0.9-2.0 ng/ml (concentrations above 2.0ng/ml are generally considered toxic. |
| **Turnaround time** | 48hrs |

**Drug monitoring panel**

**1. Lithium, Li+**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator for 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 1 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |

| | |
|---|---|
| **Method** | Ion selective Method |
| **Reference range** | Therapeutic Con……. 0.6-1.2mmol/l,<br>Toxic Concentration ……>2.0 mmol/l<br>*Note: A lithium Concentration in excess of 1.5 mmol/l in a specimen drawn 12 h after lithium intake indicates an increased risk of toxicity** |
| **Turnaround time** | 24 hrs |

**2. Carbamazepine**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator for 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. for longer period |
| **Stability** | Serum is stable for 7 days at 2-8°c and for longer period at -20°c |
| **Method** | Spectrophotometrically |
| **Reference range** | Therapeutic Con……. 4 - 8 µg/mL (16.9 - 33.8 µmol/L),<br>Toxic Concentration …… 6 -12 µg/mL (25.4 - 50.8 µmol/L) |
| **Turnaround time** | 72 hrs |

**3. Phenobarbital**

| | |
|---|---|
| **Patient preparation** | Not necessary |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator 2-8°c for 4 Days or store in freezer at -20°c temp. up to 1-2 months |
| **Stability** | 1-2 months capped at ( -15-(-25 °C)4 days capped at 2-8 °C |
| **Method** | Spectrophotometrically |
| **Reference range** | 15-40 µg/mL |
| **Turnaround time** | 72 hrs |

**4. Phenytoin**

| | |
|---|---|
| **Patient preparation** | Phenytoin measurements be collected at least 2 hours after an intravenous dose of fosphenytoin and at least 4 hours after an intramuscular dose |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator for 48 hours at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. 1-2 months. |

| | |
|---|---|
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1‑2 months at -20°c |
| **Method** | Spectrophotometrically |
| **Reference range** | 10-20 µg/mL |
| **Turnaround time** | 72 hrs |

**5. Valproic acid**

| | |
|---|---|
| **Patient preparation** | Specimens for valproic acid analysis should be drawn just prior to dose, preferably in the fasting state |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c . |
| **Storage** | Keep serum in refrigerator for 2 days at room temperature, 2-8°c for 7 Days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 1 month at -20°c |
| **Method** | Spectrophotometrically |
| **Reference range** | Therapeutic Con……. 50-100 µg/mL<br>Toxic Concentration …… >100µg/mL |
| **Turnaround time** | 72 hrs |

**Other tests**

**1. Adrenocorticotropic hormone, ACTH**

| | |
|---|---|
| **Patient preparation** | The patient should consume a low-carbohydrate diet for 48 hours before the test. Fasting and limited physical activity for 10 to 12 hours before the test is required. |
| **Sample Type** | Serum |
| **Container** | Red-Stopper tube or Serum-Separator tube |
| **Volume** | 2 ml of serum or 3-5 ml of whole blood |
| **Transport** | Serum should be transported immediately 2-8c |
| **Storage** | Keep serum in refrigerator 2-8°c for 7 Days or store in freezer at -20°c temp. up to 3 months |
| **Stability** | Serum is stable for 7 days at 2-8°c and for 3 month at -20°c |
| **Method** | Electro-chemiluminescence immunoassay |
| **Reference range** | 6.0–76.0 pg/mL |
| **Turnaround time** | 72hrs |

| Test | Critical Low Value | Critical High Value |
|---|---|---|

Panic Result of Clinical Chemistry Test

| | | |
|---|---|---|
| Amylase | | > or = 300 U/L |
| Calcium Total | < 6.0 mg/dl | > 13.0mg/dl |
| Creatinine Kinase (CK) | | > 300 U/L |
| Creatinine | | > 8.0mg/dl |
| Glucose | < 50mg/dl | > 400md/dl |
| Phosphorus | < 0.49 mmol/L | |
| Potassium | <2.5 mmol/L | > 6.5 mmol/L |
| Sodium | < 120 mmol/L | > 155 mmol/L |
| Total Bilirubin | | > 171 um5.0mg/dl (> 5 days)<br>> 18mg/dl (0 – 5 days) |
| Uric Acid | < 1.5mg/dl | > 12.0mg/dl |
| Calcium ,ionized | <2.5 mg/dl | >6.5.0 mg/dl |
| APTT | | >> > 70sec |
| PT | | > 42 s INR > 4.5 |

## Immunology and hematology

### Complete blood count, Full Blood Count, CBC, FBC

| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | Whole Blood |
| **Container** | Lavender-stopper (EDTA whole blood) tube |
| **Volume** | 3-5 ml of whole blood |
| **Transport** | At room temperature |
| **Storage** | Keep whole blood at room temperature for 8 hours. |
| **Stability** | 8 hrs for Haematological parameters |
| **Method** | Automated cell counter |

**Reference range**

| Parameters | Range for Females | Range for Males |
|---|---|---|
| WBC | 3.98 – 10.04 | 4.23 – 9.07 |
| Neut% | 34.0 – 71.1 | 34.0 – 67.9 |
| Lymph% | 19.3 – 51.7 | 21.8 - `53.1 |
| Mono% | 4.7 – 12.5 | 5.3 – 12.2 |
| Eo% | 0.7 – 5.8 | 0.8 – 7.0 |
| Baso% | 0.1 – 1.2 | 0.2 – 1.2 |
| Neut# | 1.56 – 6.13 | 1.78 – 5.38 |
| Lymph# | 1.18 – 3.74 | 1.32 – 3.57 |
| Mono# | 0.24 – 0.36 | .04 - .54 |
| Eo# | 0.04 – 0.36 | 0.04 – 0.54 |
| Baso# | 0.01 – 0.08 | 0.01 – 0.08 |
| RBC | 3.93 – 5.22 | 4.63 – 6.08 |
| HGB | 11.2 – 15.7 | 13.7 – 17.5 |
| HCT | 34.1 – 44.9 | 40.1 – 51.0 |
| MCV | 79.4 – 94.8 | 79.0 – 92.2 |
| MCH | 25.6 – 32.2 | 25.7 – 32.2 |
| MCHC | 32.2 – 35.5 | 32.3 – 36.5 |
| RDW-CV | 11.7 – 14.4 | 11.6 – 14.4 |
| RDW-SD | 36.4 – 46.3 | 35.1 – 43.9 |
| PLT | 182 – 369 | 163 – 337 |
| MPV | 9.4 -12.3 | 9.4 – 12.4 |

| | |
|---|---|
| **Turnaround time** | 24 hours |

### T Lymphocyte Differentiation

| | |
|---|---|
| **Patient preparation** | **Not necessary** |

| | |
|---|---|
| **Sample Type** | Whole Blood |
| **Container** | Lavender-stopper (EDTA whole blood) tube |
| **Volume** | > than 1/3 of the standard tube |
| **Transport** | At room temperature |
| **Storage** | Keep whole blood at room temperature for 8 hours. |
| **Stability** | 48 hrs for flowcytometry parameters |
| **Method** | Automated cell counter |

**Expected Values**

| Analyte | Adult Ethiopian Reference Range | | Units |
|---|---|---|---|
| | Male | Female | |
| CD3 Cell | 696--2738 | 871-2413 | cells/µL |
| | 62.0--90.7 | 58.3—87.0 | % |
| CD4 Cell | 306--1249 | 456--1368 | cells/µL |
| | 24.7—53.7 | 29.0—57.9 | % |
| CD8 Cell | 318--1891 | 273--1418 | cells/µL |
| | 23.0—60.7 | 17.4—50.1 | % |

**Turnaround time** **24 hours**

## HIV Molecular Tests

### DNA-PCR for Early Infant Diagnoses (EID)

| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | DBS |
| **Container** | Lavender-stopper (EDTA whole blood) tube<br>Or use What man 903 Dried Blood Spots (DBS) card. |
| **Volume** | 3-5 ml of whole blood or 4-5 full spots of on a What man 903 DBS. |
| **Transport** | DBS Sample transported at room temperature |
| **Storage** | Store at -20°c for prolonged period |
| **Stability** | DBS Stable at room Temperature up to 3 months and -70/-80 for long period of time |
| **Method** | Real Time PCR |
| **Reference range** | Negative/Positive |
| **Turnaround time** | 10 days |

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| | |
|---|---|
| **Patient preparation** | **Not necessary** |
| **Sample Type** | Plasma |
| **Container** | Lavender-stopper (EDTA whole blood) tube |
| **Volume** | 3-5 ml of whole blood |
| **Transport** | Whole blood Sample transported at room temperature |
| **Storage+** | Keep whole blood at room temperature for 4 hours, but no longer than 6 hours and separate plasma as soon as possible and store until test done at -20°c for not more than one month. |
| **Stability** | Plasma is stable for 24 hours at room temperature, or 5 days at 2-8°c or 1 month at -20°c and for longer period at -70 °c and colder. |
| **Method** | RT-PCR |
| **Reference range** | <Low detection Limit(LDL) |
| **Turnaround time** | 10 days |

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3. HIV molecular test manual
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5. Sysmix 1800xt test for hematology taste