MANUAL OF LABORATORY SERVICES

For tests performed in or referred by

DEPARTMENT OF PATHOLOGY
HACKENSACK UNIVERSITY MEDICAL CENTER
30 PROSPECT AVENUE, HACKENSACK, NJ 07601

The procedures outlined in this manual will be followed unless a different procedure is specifically requested by the physician. A Pathologist must be contacted to approve any such deviation from standard protocol.

These test reference ranges are valid as of the date of this revision. New test methodologies and instruments within the department may result in changes to these ranges. All patient reports are released from the department with current reference ranges on the report. Always refer to the patient report for the most updated reference range for a procedure.

Revised 9/2015, 3/2016

Approved by:
Ciaran M. Mannion, MD 07/24/2014, 9/2015, 3/2016
Chair, Department of Pathology and Laboratory Director
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I. GENERAL INFORMATION

A. HOURS

: Mon-Fri: 7AM - 3PM  FULL SERVICE
  3PM - 7AM  STAT SERVICE and selective routine testing.*
Sat/Sun/Holidays:
  ALL SHIFTS - STAT SERVICE and selective routine testing.*
  (Refer to alphabetic listing of tests,  Weekends/Holiday for test availability)
* Routine testing is dependent on the Stat workload and staffing of the Department.

B. LOCATION

The Main Laboratory and the Stat Laboratory of the Department of Pathology are located on the first floor, East and West Pavilion Building.

C. TELEPHONE DIRECTORY

<table>
<thead>
<tr>
<th>Service</th>
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<tbody>
<tr>
<td>Main Laboratory Number</td>
<td>551-996-4860</td>
</tr>
<tr>
<td>Anatomical Pathology/Cytology Reports</td>
<td>551-996-4808</td>
</tr>
<tr>
<td>Blood Bank</td>
<td>551-996-4813</td>
</tr>
<tr>
<td>Charting</td>
<td>551-996-4812</td>
</tr>
<tr>
<td>Chemistry</td>
<td>551-996-4862</td>
</tr>
<tr>
<td>Cytology</td>
<td>551-996-4852</td>
</tr>
<tr>
<td>Diagnostic Technicians Office/Phlebotomy (5 Main, Room 5645)</td>
<td>551-996-4829</td>
</tr>
<tr>
<td>Out-Patient Blood Drawing</td>
<td>551-996-3062</td>
</tr>
<tr>
<td>(Medical Plaza Building, 4th Floor)</td>
<td></td>
</tr>
<tr>
<td>Hematology</td>
<td>551-996-4885</td>
</tr>
<tr>
<td>Histology</td>
<td>551-996-4870</td>
</tr>
<tr>
<td>Microbiology</td>
<td>551-996-4859</td>
</tr>
<tr>
<td>Molecular Pathology</td>
<td>551-996-4859</td>
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II. TEST REQUESTS/COLLECTION OF SPECIMENS

A. Ordering Laboratory tests

Laboratory tests will be performed only upon the order of individuals authorized by hospital policy or State regulation. Authorized individuals include physicians, dentists, residents, podiatrists, chiropractors, physician assistants, advanced practice nurses (in collaborative agreements) or other health care professionals authorized by Board rule, public health officer/agency or local board of health. A Medical Board-approved Clinical Order Set, once signed by the physician, allows a nurse to order tests as outlined in the specific order set. Established protocols approved by the Medical Board also allow specific testing to be ordered as outlined in the protocol.

HIS ORDERING: All laboratory test requests should be appropriately ordered by the nursing unit/service in the hospital computer system. For specific instructions in this area, please refer to the Epic On-line Resources on the HUMCnet homepage or call the HELP Desk at ext. 4357. If a test ordered as “miscellaneous” is unclear (e.g. a request using non-standard or non-specific terms), the Laboratory will call to clarify it with the ordering nursing unit/physician prior to entry into the Lab computer system.

DOWNTIME: In the event of HIS downtime, test requests should be submitted on Downtime Forms, which are available from the Hospital Storeroom.

ADD-ONS: Once a specimen has been collected, requests for add-on tests must be called directly to the appropriate Laboratory section prior to ordering it in the HIS. The section will determine the suitability of the collected specimen for the requested additional test(s). It is then the responsibility of the requesting unit/service to order the test in Epic as an “add-on”.

OUT-PATIENTS Requests for Out-Patient testing must be accompanied by a script or requisition from an authorized person (see above), which must include an appropriate ICD-9 code or diagnosis. The Laboratory will not accept verbal orders. Any test orders that are unclear will be clarified with the physician/other provider prior to being entered into the medical center’s computer system.
B. Specimen Collection and Transport

Specimens are collected by the Diagnostic Technicians (who also perform EKG’s on the units), other laboratory personnel, or on the nursing units/services by physicians, physician assistants, nurses, or designated technicians (i.e. ETD Technicians).

The Diagnostic Technicians collect blood specimens, both routine and Stat, according to a Spectralink (phone) system, whereby locations within the medical center are assigned a specific phone number as a means of accessing the Technician on all shifts. A Charge Technician is always available for issues needing immediate resolution. A listing of these Spectralink phone numbers is on page 11 of this manual.

The following standards apply to all specimen collections:

a. Check the collection requirements (type of tube, volume of specimen, scheduling requirements, etc.) listed in this manual for the specific test(s) to be ordered. The hospital computer order entry system also provides specimen collection requirements during the ordering process. Clarify any questions with the Laboratory prior to specimen collection.

b. Identify the patient immediately prior to specimen collection as per Administrative Policy 1402-1: Identification of Patients. This policy requires at least two patient identifiers (patient name and date of birth or medical record/Trauma number) when confirming the identity of the patient prior to beginning tests, treatment, or service. This is accomplished by means of a patient identification bracelet for banded patients, a verbal standard of identification for unbanded patients, and application of the verbal I.D. standard prior to tests, treatment or service. Staff must compare information verbally provided by the patient and the information on the order with the medical record and/or bracelet. Note: Clinical areas photographing patients may use the patient picture as one of the identifiers. If the staff member leaves or is otherwise interrupted prior to collecting the specimen, then the staff member should repeat the identification process.

c. Wear gloves in accordance with the universal (standard) precautions guidelines for handling blood and body fluids.

d. Label the specimen clearly for identification. All specimens delivered to the Laboratory must include a legible patient name and other unique identifier, such as the medical record (U#) number, billing number (B#), DOB or an ETD Trauma number. The identifying label must be attached to the specimen container(s) at the time of collection in the presence of the patient, and not deferred until a later time.

A computer-generated “clinician obtained specimen form” or a downtime form should accompany all specimens.

UNLABELED or INCORRECTLY LABELED specimens will not be routinely accepted by the Laboratory. The ordering site will be informed of the problem.
and a new specimen will be requested. The decision to accept a “PRECIOUS SPECIMEN” (difficult or impossible to replace; for example: CSF, biopsy specimen) will be made on an individual basis by the section supervisor in conjunction with the appropriate administrative and/or medical personnel. Documentation of this correction and any follow-up actions taken will be made through an incident report filed with Risk Management or a sectional log.

**Blood Bank Labeling:** Specimens for Blood Bank have additional requirements. Two individuals (i.e. Diagnostic Technicians, ER Technicians, Registered Nurses, APNs, Physician Assistants or physicians, or combination thereof) who are qualified to draw blood specimens must approach the patient and witness the collection procedure, bringing the specimen label to the bedside. **After the required 2-patient identification, the specimen(s) will be drawn and must be labeled at the bedside and not deferred until a later time.** Labels must be placed on the tube without obscuring an original blank tube label. The required information can also be written directly on the vacutainer tube label.

**A Blood Bank specimen label must have the following information:**

1. Patient identification:
   a. Patient name (exactly as written on the ID bracelet) and medical record number,
   b. for Code 55 ONLY - ETD Trauma number.
2. Date of collection.
3. A legible signature and/or printed name and/or hospital provider identification number of the individual who drew the specimen and
4. A second legible signature and/or printed name and/or hospital provider identification number of the person witnessing/verifying the drawing and labeling of the specimen.

**NOTE:** Blood Bank specimens received in the Blood Bank without this procedure being followed will be discarded and the blood draw must be repeated.

The use of preprinted labels is deemed acceptable by the NJ State Department of Health and Senior Services as long as it contains the same information as the patient’s ID bracelet. Therefore, areas that have the capability of generating computer labels may use them to label blood bank specimens. If the computer label does not differentiate the individual who drew the specimen from the witness/verifier, the name/code of the person who drew the specimen should be circled.

Blood Bank specimen labels for use by collecting sites are also available from Distribution. This label has pre-printed “prompts” (Name, Drawn by, Verified by, Date) for ease of use.

e. The specimen(s) may be delivered to the Laboratory by pneumatic tube or by
Transport all specimens in tightly sealed containers, if applicable, to prevent external spillage that could contaminate personnel and equipment.

If the pneumatic tube system is available, refer to the following Pneumatic Tube Protocol to determine specimen suitability for this process.

f. If the specimen is sent by courier, there is a specimen receiving area in the Stat Laboratory for the drop-off of ROUTINE and STAT specimens.

Collections Sent Via Pneumatic Tube

The following is a basic outline for sending specimens to the Laboratory via pneumatic tube. Specific instructions regarding the use of the system can be found in the institution’s Pneumatic tube policy. The pneumatic tube system is maintained and serviced by the Plant Operations Department. Specific problems, questions etc. should be directed to that department (ext 2032).

A. Any specimen sent through the pneumatic tube system must be in a tightly sealed vacutainer, blood culture bottle, screw top or culturette container. Each specimen tube must be appropriately labeled. Insert the container into a specimen bag; this will contain leakage if necessary, preventing soilage of the tube system.

NOTE: UNLABELED, INCORRECTLY LABELED, LEAKING OR BROKEN SPECIMENS WILL NOT BE ROUTINELY ACCEPTED BY THE LAB. See page 8 regarding the labeling of “precious specimens”.

B. Do not place the requisition inside the specimen bag. Insert the requisition in the open end pouch attached to the specimen bag.

C. Place the specimen bag into a properly lined carrier (several different liners are available). Never overload a single carrier as this can result in specimen damage. Use multiple carriers if necessary.

Note: If multiple vacutainer tubes are placed in one carrier, the tubes must be PARALLEL TO EACH OTHER. Do not overlap vacutainer tubes as they may break during transport.

D. If additional liners or carriers are needed, contact Plant Operations (x2032). DO NOT CALL THE LABORATORY. The Laboratory does not store carriers or liners, but returns them to the house-wide system as soon as they are emptied.

E. Close and check that the carrier is securely latched.

F. Carefully punch in one of the station codes of the Laboratory: 206 or 413 or 603.
THE FOLLOWING ITEMS ARE PROHIBITED FROM TRANSPORT THROUGH THE PNEUMATIC TUBE SYSTEM AT ALL TIMES:

1. Syringes, needles, and sharps of any kind.
2. Personal items, including inter-office mail.
3. Items over 5 pounds.
4. Items too bulky to fit easily in the carrier. *Never force items into a carrier!*
5. Food or beverages.
6. Specimens with specific temperature or transport requirements:
   - Blood Ammonia (keep on ice)
   - Cold agglutinin (keep in warm water)
   - Complement, Total (keep on ice)
   - Cryoglobulin (keep in warm water)
   - Homocysteine (keep on ice)
   - Lactic acid (immediate transport)
   - Platelet aggregation (do not agitate in transport)
   - Renin (immediate transport)
7. 24 hour urine containers.
8. Precious Specimens - i.e., those that would be difficult or impossible to replace if lost or broken. These include CSF, fetal fibronectin (fFN) specimens, cytology brushings, tissue or bone marrow specimens. Department-approved exceptions may be made by the Department of Pathology.
9. Blood/blood products for transfusion, that are considered *Rare* units.
10. Cytology specimens in Coplin jars and Loop containers.

**WHEN IN DOUBT, CALL THE SPECIFIC LABORATORY SECTION.**
### Diagnostic Technician SpectraLink Assignments

Ext. 4829 Day Shift Coordinator for questions and/or concerns

**71974 - Charge Tech available 24/7**

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<tr>
<td><strong>71981</strong> - Pavilion</td>
</tr>
<tr>
<td><strong>71986</strong> - Women’s &amp; Children</td>
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<tr>
<td><strong>71959</strong> - Conklin, Strawbridge, St.John, Main (Old Building)</td>
</tr>
<tr>
<td><strong>71960</strong> - 2 Main (M-F)</td>
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<td><strong>72001</strong> - 2 Main (Sat and Sun)</td>
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<th>9 A.M. – 2 P.M.</th>
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<td><strong>71983</strong> - 3 Links, Recovery, OR, Open Heart, Vascular Lab</td>
</tr>
<tr>
<td><strong>71982</strong> - 4, 5, 6 St. John, 4 and 5 Strawbridge, Ultrasound (1st Fl St. John)</td>
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<td><strong>71958</strong> - 3 Conklin, 3 Pavilion East and West, 3 Strawbridge (Allergy Center)</td>
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<td><strong>72001</strong> - 4 Pavilion West, 5 Pavilion East and West, MICU, CCU, 4 Conklin</td>
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<td><strong>71985</strong> - 8 Pavilion East and West, 9 Pavilion East and West, Mediplex, 4 and 5 Main</td>
</tr>
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<td><strong>71986</strong> - Women’s &amp; Children, Mother and Baby- East Building and Nursery, Peds ER</td>
</tr>
<tr>
<td><strong>72014</strong> - Women’s &amp; Children, Mother and Baby- West Building and Nursery, L &amp; D, NICU</td>
</tr>
<tr>
<td><strong>71960</strong> - 2 Main (M-F)</td>
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<tr>
<td><strong>72001</strong> - 2 Main (Sat and Sun)</td>
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<td><strong>72014</strong> - Women’s &amp; Children 2 and 3rd, 2 Link Recovery, 2 Main, Peds ER, R-Oncology</td>
</tr>
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<td><strong>71958</strong> - Women’s &amp; Children 4th and 5th.</td>
</tr>
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<td><strong>71960</strong> - Pavilion 2, 3, 4 PW, 3 Conklin, Ground Cath Lab</td>
</tr>
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<td><strong>71965</strong> - 3 Links, Open Heart, SAS, OR (2 Link), 5 Strawbridge, 5 St. John</td>
</tr>
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<td><strong>71959</strong> - 2 Main, 4 Links, SICU, 4 Strawbridge, 4 St. John, 6 St. John, R-DAR (1 Link), MRI</td>
</tr>
<tr>
<td><strong>71961</strong> - 4 PE, 5, 8, 9 Pavilion East and West, 5 Main, 5 Conklin, Johnson Hall, Mediplex + Charge Tech Duties-71974</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10 P.M. – 5 A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>71958</strong> - 3, 4, 5, 8, 9 East and West Pavilion</td>
</tr>
<tr>
<td><strong>71960</strong> - ST. John, Main, including 2 Main, Conklin, Open Heart, Recovery (2 Link), 2 Pavilion East and West and 4 Pavilion East AM Rounds.</td>
</tr>
<tr>
<td><strong>71984</strong> - 4 and 5 Strawbridge, 3 and 4 Link and SICU AM Rounds.</td>
</tr>
<tr>
<td><strong>72014</strong> - Womens and Children Hospital, NICU AM Rounds</td>
</tr>
</tbody>
</table>
C. Unsatisfactory/Sub-Optimal Specimen Policy

Unsatisfactory criteria: A specimen may be deemed unsatisfactory for processing for various reasons, including but not limited to, the following:

- insufficient volume
- unlabeled or improperly labeled
- improper collection or storage prior to receipt in lab
- damaged in transit
- contamination
- failure to meet the "patient preparation" requirements for the specific procedure as given in the laboratory floor procedure manual.

Notification: Upon receipt of an unsatisfactory specimen, the laboratory will notify the appropriate nursing unit, hospital service, or, in the case of an out-patient, the physician or his office. The status of the unsatisfactory specimen and the notification information will be documented in the laboratory computer system. If a replacement specimen is to be sent, the original test order will be cancelled by the Lab and unit/service must reorder the test. The replacement specimen will be processed in the Lab under a new accession number.

Documentation: If the physician requests that a properly labeled specimen be analyzed despite its classification as “unacceptable”, the following should be documented as a chartable footnote on the patient report: the reason for the unacceptability; the limits in test result interpretation created by this unacceptability; and the physician’s name who requested that the test be run.

Sub-optimal: Sub-optimal samples will be analyzed as deemed appropriate by the technologist/technician, but the sample condition will be indicated as a footnote on the patient’s test report. This will serve as notification to the requesting physician. The footnote will be attached to the specific test(s) that would be affected by the condition. For example: serum hemolysis might be attached to a potassium result. The footnote should also indicate “clinical correlation recommended”. Any dialogue with the physician or other medical personnel regarding the specimen will be documented in this footnote.

Sub-optimal blood samples include, but are not limited to: hemolyzed and lipemic specimens.

Sub-optimal urine samples include, but are not limited to: urines of such unusual or dark color that it interferes with the validity of test results; hemorrhagic urine samples; and positive bilirubin results by dipstick.

If the suitability of a specimen is in question, a pathologist should be consulted.

D. Routine Procedures

1. Blood specimens for routine testing will be drawn by the Diagnostic Technicians on 5 AM rounds. All requests for work to be drawn at this time must be ordered through
the Epic system by 4 AM of that morning. Routine orders placed after that time will automatically default to late morning pickup.

2. Routine urinalysis specimens should be first morning specimens unless otherwise specified by the physician. All routine urinalysis specimens should be kept refrigerated until they can be delivered to the laboratory.

3. Routine laboratory testing will be performed as indicated in the alphabetical listing of tests in this manual.

E. Timed Requests/ Timed Collections

1. Timed requests are not stat but are those that must be drawn at a specific time, i.e., 10AM, 4PM, etc. Results of timed requests will be available within 4 hours of the time a test is drawn.

2. All timed requests must be entered in the EPIC system at least 1 hour prior to the collection time if they are to be drawn by the Diagnostic Technicians. Notify the Diagnostic Technician Office at x 4829.

3. Timed collection of urine specimens (24 hr etc.):

   a. Check to see if the specific test must be scheduled in advance, and if a preservative is needed. Also check for specific time interval (24 hours, 2 hours, etc.).

   b. Obtain a collection bottle from Central Supply the day before the test. If preservative is needed, contact the Chemistry laboratory (ext. 4862.)

   c. Label the collection bottle clearly with the patient name, medical record number, and date of collection.

   d. Collection of urine should preferably begin at 7AM.

   e. At the start of the collection period, have the patient void to empty the bladder before collection begins. Discard this specimen. Record exact time and date.

   f. Save all urine voided during the specified number of hours. Keep urine refrigerated or on ice.

   g. At the end of the collection period (i.e., 7AM the next day if time interval is 24 hours), have the patient empty his/her bladder. Add this specimen to the collection bottle and record the exact time and date.

   h. Send the labeled specimen and clinician-obtained specimen form to the laboratory immediately upon completion. Note the total collection time where appropriate on the form.
F. Stat Procedures

**DEFINITION:** "STAT" tests are limited to those required for an acutely ill patient where the result would clearly and significantly influence **immediate patient management.** The result is considered mandatory within 60 minutes, unless otherwise indicated, from the time the specimen is received in the Laboratory to result verification and availability in the HIS computer.

**DRAW STAT** SPECIMENS: These are laboratory specimens that require immediate ("stat") specimen COLLECTION due to various reasons (examples: patient is to be discharged, patient needs to go for other testing—such as x-ray—physician wants specimens drawn prior to a medication dose, etc.).

**IMPORTANT**

DRAW STAT specimens are PROCESSED in the Lab as ROUTINE specimens.

**ORDERING:** All requests for collection of Stat/Draw Stat specimens that are not collected by the unit themselves must be called to the specific Diagnostic Technician SpectraLink phone designated on page 11. The computer generated Stat form or downtime form (as applicable) must be available to the Diagnostic Tech who arrives to draw the specimen.

**NOTE:** During morning rounds (5 AM – 7:30 AM) all "Stat" and "Draw Stat" requests should be directed to the SpectraLink phones designated on page 11 of this manual.

Only test procedures listed on the STAT procedure list will be honored on a STAT basis.

**STAT Procedure List**

**BLOOD BANK**
- All Blood Bank procedures can be ordered Stat **except:**
  a. Antibody titers
  b. Isoagglutination titers

**CHEMISTRY**
- Albumin
- Acetone
- Alcohol
- Alkaline Phosphatase
- ALT
- Ammonia
- Amylase
- AST
- Bilirubin, Total and Direct
- BNP
BUN
Calcium (serum and ionized)
Carbamazepine (Tegretol)
Chem Screen
Chloride
CK, Total
CK-MB
CO2
Creatinine
Digoxin
Dilantin
FFN
Gentamicin
GGTP
Glucose (serum & CSF)
HCG, serum for pregnancy
Lactic Acid (serum & CSF)
LD (Lactic dehydrogenase)
Lipase
Lithium
Magnesium
Methotrexate
Microbilirubin (Neonates only)
Mini-Screen (Glucose, BUN, Calcium, Creatinine, Sodium, Potassium, Chloride, CO2)
Osmolality
Phenobarbital
Phosphorus
Potassium
Protein (Serum & CSF)
PTH – only on intraoperative parathyroidectomies
Salicylate
Sodium
Theophylline
Tobramycin
Troponin I
Uric Acid
Vancomycin

HEMATOLOGY
CBC only, CBC with Automated Differential, CBC with manual Differential
Cell Count, Spinal and Cavity fluids
Cell count, peritoneal dialysis fluid (only on request.)
D-Dimer
Differential, Automated
Differential, Manual (only by specific request)
Fibrinogen
Hematocrit
Hemoglobin
PFA 100
Platelet Count
PT (Prothrombin Time)
PT Mixing Study
PTT (Partial Thromboplastin Time)
PTT Mixing Study
Thrombin Time
Vidas D-Dimer (ETD patients only)

IMMUNOLOGY
STS - performed STAT only on obstetrical patients in active labor who have no previous syphilis serology test on record and newborns as indicated.

MICROBIOLOGY
Cultures are processed on all shifts
Gram Stains - performed STAT only if designated on the order.
Legionella Urinary Antigen
Rapid Group A Strep Antigen Screen
Streptococcus pneumoniae Urinary Antigen

URINALYSIS
Standard Urinalysis
Urine Drug Screen

G. New Admissions

If a patient is admitted directly to the nursing unit and has not had work performed on pre-admission testing (PAT), the required tests should be ordered routinely for the next morning. **Do not order stat unless specifically designated on the order sheet.**

H. Pre-Admission Testing (PAT)

All pre-admission testing (PAT) will be drawn in the designated HUMC PAT Center (Hackensack or Westwood campus). Once verified by the Laboratory, the test results are available on the HIS.

I. Pre-operative Requests (pre-ops)

Whenever possible, such requests should be submitted at least 24 hours in advance of the scheduled operation. **Do not delay until the evening shift before surgery.**

J. Point-of-Care Testing

Point-of-Care (P-O-C) testing is defined as laboratory testing that is performed by hospital staff outside of the physical confines of the Department of Pathology (i.e. Nursing units,
Out-Patient facilities, etc.). All P-O-C testing in the Medical Center must be performed in consultation with the Department of Pathology and in compliance with applicable federal, state, and other regulatory agency guidelines. This includes all waived and non-waived testing as classified by the CMS (formerly HCFA) Clinical Laboratory Improvement Amendments of 1988 (CLIA ‘88).

Prior to instituting any procedure identified as a laboratory test, a department or service of the Medical Center must notify the Department of Pathology in writing of their intention. Memos should be addressed to: Ciaran Mannion, MD, Chairman of Pathology. The Pathology Department will work with that department or service to evaluate the request and address the pertinent issues, which include licensure, equipment evaluation, training, policies and procedures, and quality control. Specific requirements for each procedure will vary depending upon the complexity classification of the procedure and upon the specific standards of the applicable accrediting agency.

K. Reference Laboratory Testing

While a patient is under the hospital’s care, all laboratory testing must be done in the hospital’s laboratories or in approved reference laboratories. All reference laboratories must be recommended by the Pathology Chairman to the Medical Staff for approval. The Department of Pathology will maintain a listing of approved reference laboratories.

Requests for additions to this approved list must be submitted in writing to: Ciaran Mannion, MD, Chairman of Pathology. Accompanying this request must be the appropriate credentials of the proposed reference laboratory, including proof of federal CLIA licensure, State licensure, and accreditation (i.e.: JCAHO, CAP – as applicable).

III. REPORTING RESULTS

A. Turn-Around Times

The turnaround time for laboratory tests represents the time period from specimen receipt in the laboratory to result availability. This does not include specimen collection time, but
starts when the specimen actually arrives in the laboratory. The turnaround time for specific tests is indicated in the alphabetical listings of procedures in this manual.

If the reporting of patient test results will be significantly delayed, appropriate administrative and/or medical personnel will be notified by the Laboratory. The type of action taken will be determined by senior sectional personnel in conjunction with the pathologist and laboratory administrative personnel.

B. Availability of Laboratory Results

Computer: The results of laboratory tests are available on the hospital computer system as soon as the results have been verified by the department. Terminals are available on the nursing units and in the physician's lounge for this purpose. The units can also check the testing status (verified, received in lab, etc.) in the computer. Access to their patients’ lab test results is also available to physicians through off-site computer access.

If there is an undue delay in obtaining results, contact the Pathology Administrative Director (ext. 4825) or during the day shift Monday - Friday, the Senior Technologist on weekend or holiday days (ext. 4860), or the Stat Laboratory Charge Tech (ext.4860) during the evening and night shifts all days.

NOTE: A “charge tech” is always designated when the above individuals are not scheduled. This includes evenings and nights, and all shifts of weekends/holidays.

Charting: The hospital computer system (EPIC) allows the majority of clinical reports to be directly viewed on the hospital system. Printed chart copies of the patient reports are generated by the Laboratory information system for those tests that are not currently available on EPIC (surgical/cytology reports, miscellaneous lab tests, reference lab procedures with extensive interpretative data, etc). These reports are then filed in the permanent patient medical record. TotaLab Out-Patient reports are either printed and delivered to the ordering physician, faxed to the office, or sent on Labtest (an internet-based result retrieval system). The LIS will also archive the information for future reference if necessary.

C. Critical Values

Critical Values are laboratory values, performed either in-house or in approved reference laboratories, which reflect pathophysiological derangement at such variance from normal as to be life-threatening or to cause imminent physical harm to the patient unless immediate therapy is instituted. This list has been compiled with the approval of the Medical Board. To avoid unnecessary delay in therapy, as soon as a critical laboratory value is obtained, the following will occur:

(1) The result is confirmed. Depending on the test result in question, this confirmation can be by specimen repeat, by concurrence with patient diagnosis, by patient history, or by other means approved by laboratory sectional supervisory staff. For Adult ETD patients, see the narrative below. Pediatric ER patients will follow the In-Patient protocol.
(2) The location of the patient is established.

(3) The appropriate medical personnel are notified as follows:

**For In-Patients:**
Once confirmed, the laboratory will immediately call the result to the appropriate licensed clinical personnel (RN, APN, PA, MD) responsible for the patient’s care to report the critical result(s). The nurse/physician/PA receiving the critical test results will then be asked to “read-back” the test results to verify the accuracy of these results (HackensackUMC Admin. Policy 530).

**For ETD (Adult) Patients:**
1. The laboratory will immediately call the critical value to the ETD physician indicated on the patient order. The physician will be contacted first by spectralink phone and if not reachable after 2 attempts, ext. 2217 will be called. If the physician still cannot be reached, the charge nurse at ext. 2612 or the lead clerk at ext. 2240 should be called to locate the provider. Revised lists of spectralink numbers must be provided by the ETD when any updates are made. **NOTE: If there is no ETD physician indicated on the patient order, the lead clerk at ext. 2240 should be called to assist in locating the correct ETD physician before calling ext. 2217.**
2. The physician receiving the critical result will be asked to “read back” the test result to verify the accuracy of the information given (HackensackUMC Admin Policy 530). Documentation of notification and read back will be as per department policy.
3. If the physician questions the validity of the critical value, the following actions may be taken at his request:
   a. The test may be repeated on the same patient specimen. If the repeat agrees with the original result, the tech will footnote in the LIS that a repeat confirmed the original result.
   b. If the repeated result differs from the initial result, the physician will be consulted as to what further action is indicated. These actions may include the following:
      i. The MD may decide the repeated result is more in line with the patient’s clinical presentation and accept this repeated result. If the MD makes the decision to use the repeat as the final value, the initial result will be error corrected in the LIS. **Note:** The original result along with all documentation will remain part of the patient’s medical record as a footnote.
      ii. The physician may request that the initial specimen be run a third time and that the initial result of the two closest values be reported in the LIS.
      iii. The physician may order a new specimen to be drawn and sent to the laboratory for analysis. The specimen will be processed and if a critical result is obtained, it will be called to the MD as per
laboratory policy. The results of both orders will appear in the patient’s medical record.

For Out-Patients:
Once confirmed, the laboratory will immediately call the physician’s office and ask to speak to the physician or a nurse. If unable to do so in a timely manner, we will clearly state to the office staff that we have a critical value that must be communicated to the physician or a nurse and request that he/she contact us as soon as possible. If an answering service is reached, the Lab representative will state that they have a critical lab result on the physician’s patient and that the physician should call back as soon as possible to get this result. While a critical value will NOT be given to office staff or an answering service, the Lab tech/clerk calling the critical should document in the computer/log sheet who they spoke to at the office/answering service. Once the physician calls back, the Lab will request a “read-back” of results given to verify the accuracy of the results (HUMC Admin. Policy 530).

For Patients from areas not in 24 hour operation:
In all cases, an attempt will first be made to contact the individual areas noted below. If this proves unsuccessful, the following will occur:
- Reuten Clinic – The laboratory will contact, through the service, the physician on call.
- Adult Oncology - The laboratory will contact, through the service, the physician on call.

(4) DOCUMENTATION OF NOTIFICATION must be made either in the LIS or on the requisition slip/downtime form (as applicable) by the individual placing the call. This documentation must include:
- the full name and title of the individual to whom the information was given and the read-back verification,
- the date and time of call, and
- the identity of the laboratory caller.

Example: Critical glucose called to and read-back by Kristin Jones RN 03/15/11 13:00 by CH0099

Each section and shift that reports critical values will print and review an Exception Report on their shift to ensure that all critical values have been reported and documented appropriately. This review will be incorporated into the Department’s Quality Management Program.

A critical value will be identified in the EMR (Epic) by a double exclamation point (!!) or will print out on a paper patient chart with a footnote indicating its status as a critical result. The notification documentation is available in both Epic and on the paper chart as well as in the LIS.

A listing of current critical values is included in the Manual of Laboratory Services, which is available to laboratory sections and to Nursing Units, clinical services, and physicians on the HackensackUMC intranet (Departments Pathology). This Manual is also available on the Hackensack University Medical Center’s internet site.
Reference Laboratory Critical Values

The Department of Pathology does not refer specimens to reference laboratories that have the HUMC Medical Board’s recognition as “critical values”. However, if a reference laboratory notifies the Pathology Department of test results which the reference laboratory has identified as a critical or “panic” value, Pathology will follow our critical value protocol and notify the appropriate clinical practitioner of the results.

A listing of current critical values as approved by the HackensackUMC Medical Executive Committee follows:
Definition - Potential life-threatening values that will be reported immediately to a licensed healthcare provider (Physician/Nurse/PA).

### CHEMISTRY

<table>
<thead>
<tr>
<th>Test</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amylase</td>
<td>≥ 1000 U/l</td>
</tr>
<tr>
<td>T. Bilirubin, Serum</td>
<td>≥ 15 mg/dl</td>
</tr>
<tr>
<td>BUN</td>
<td>≥ 100 mg/dl</td>
</tr>
<tr>
<td>Calcium</td>
<td>≤ 6.6 or ≥ 12.0 mg/dl</td>
</tr>
<tr>
<td>CO2</td>
<td>≤ 11 or ≥ 40.0 meq/l</td>
</tr>
<tr>
<td>Glucose</td>
<td>≤ 46 or ≥ 484 mg</td>
</tr>
<tr>
<td>Glucose, Diabetic (Must be ordered as Diabetic)</td>
<td>&lt; 70 or ≥ 484 mg</td>
</tr>
<tr>
<td>Lactate</td>
<td>≥ 4.0 mmol/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>≤ 1.0 or ≥ 4.9 mg/dl</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>≤ 1.5 or ≥ 8.9 mg/dl</td>
</tr>
<tr>
<td>Potassium</td>
<td>≤ 3.0 or ≥ 6.0 meq/l</td>
</tr>
<tr>
<td>Sodium</td>
<td>≤ 120 or ≥ 150 meq/l</td>
</tr>
<tr>
<td>Viscosity</td>
<td>≥ 8.0</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>≥ 150 µg/ml</td>
</tr>
<tr>
<td>Digoxin</td>
<td>≥ 2.5 ng/ml</td>
</tr>
<tr>
<td>Dilantin (Phenytoin)</td>
<td>≥ 30 µg/ml</td>
</tr>
<tr>
<td>Lithium</td>
<td>≥ 2.0 mg/ml</td>
</tr>
<tr>
<td>Theophylline</td>
<td>≥ 25 µg/ml</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>≥ 40 µg/ml</td>
</tr>
<tr>
<td>Salicylates</td>
<td>≥ 30 mg/dl</td>
</tr>
<tr>
<td>Gentamycin peak</td>
<td>≥ 10 µg/ml</td>
</tr>
<tr>
<td>Gentamycin trough</td>
<td>≥ 2.0 µg/ml</td>
</tr>
<tr>
<td>Tobramycin peak</td>
<td>≥ 10 µg/ml</td>
</tr>
<tr>
<td>Tobramycin trough</td>
<td>≥ 2.0 µg/ml</td>
</tr>
<tr>
<td>Vancomycin peak</td>
<td>≥ 40 µg/ml</td>
</tr>
<tr>
<td>Vancomycin trough</td>
<td>≥ 15 µg/ml</td>
</tr>
<tr>
<td>Hep B S Ag</td>
<td>POSITIVE</td>
</tr>
<tr>
<td>CK-MB &amp; Troponin</td>
<td>First positive result will be called.</td>
</tr>
<tr>
<td>Cyclosporine</td>
<td>&lt; 150 or &gt; 250 ng/ml</td>
</tr>
<tr>
<td>Sirolimus</td>
<td>≤ 6.0 or ≥ 19.0 ng/ml</td>
</tr>
<tr>
<td>Tacrolimus</td>
<td>&lt; 5.0 or &gt; 15.0 ng/ml</td>
</tr>
</tbody>
</table>

### HEMATOLOGY

<table>
<thead>
<tr>
<th>Test</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCT</td>
<td>≤ 18% or ≥ 61 %</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>≤ 6.6 or ≥ 19.9 g/dl</td>
</tr>
<tr>
<td>Platelets</td>
<td>≤ 37,000 or ≥ 910,000</td>
</tr>
<tr>
<td>WBC</td>
<td>≤ 2,000 or ≥ 50,000</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>≤ 88 mg/dl</td>
</tr>
<tr>
<td>Factor Levels (excluding F XII)</td>
<td>&lt; 25%</td>
</tr>
<tr>
<td>PT/INR</td>
<td>≥ 45 sec/4.8</td>
</tr>
<tr>
<td>aPTT</td>
<td>&gt; 120 sec</td>
</tr>
<tr>
<td>CSF cell count</td>
<td>1. WBC &gt; 30 cells/ul</td>
</tr>
<tr>
<td></td>
<td>2. *Malignant cells and intracellular organisms</td>
</tr>
<tr>
<td></td>
<td>*(First time only per admission)</td>
</tr>
</tbody>
</table>

### MICROBIOLOGY

<table>
<thead>
<tr>
<th>Test</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive blood culture or Smear</td>
<td>Positive CSF culture/smear</td>
</tr>
<tr>
<td>Positive blood Parasite</td>
<td>Bioterrorism agents as advised by CDC</td>
</tr>
</tbody>
</table>

**NOTE:** Contact Department of Pathology for critical value references.
**Definition**—Potential life threatening values that will be reported to Physician/Nursing station immediately.

## CHILDREN

### CHEMISTRY
- Amylase: > 1000 U/L
- Bilirubin: > 13 mg/dl
- BUN: > 55 mg/dl
- Calcium: < 6.5 or > 12.7 mg/dl
- CO2: < 11 or > 39.0 meq/l
- Creatinine: > 3.8 mg/dl
- Glucose: < 47 or > 445 mg/dl
- Lactate: ≥ 4.0 mmol/L
- Magnesium: < 1.1 or > 4.3 mg/dl
- Phosphorus: < 1.3 or > 8.9 mg/dl
- Potassium: < 2.8 or > 6.4 meq/l
- Sodium: < 121 or > 156 meq/l

### HEMATOLOGY
- HCT: < 20% or > 62%
- Hemoglobin: < 6.9 or > 20.8 g/dl
- Platelets: < 53,000 or > 916,000
- WBC: < 2100 or > 43,000
- Fibrinogen: < 77 mg/dl
- Factor levels: < 25%

### MICROBIOLOGY
- Acetaminophen: > 150 ug/ml
- Dilantin: > 30 ug/ml
- Phenobarbital: > 40 ug/ml
- Salicylates: > 30 mg/dl
- Theophylline: > 25 ug/ml
- Gentamicin Peak: > 10 ug/ml
- Trough: > 2.0ug/ml
- Tobramycin Peak: > 10 ug/ml
- Trough: > 2.0ug/ml
- Vancomycin Peak: > 40 ug/ml
- Trough: > 15 ug/ml
- Sweat Test: > 60 meq/l

### NEWBORN (0-1 MONTH OF AGE)

- Bilirubin: > 13 mg/dl
- Calcium: < 7.0mg/dl or > 11.5mg/dl
- CO2: < 13 meq/l or > 35 meq/l
- Glucose: < 50 or > 150 mg/dl
- Potassium: < 3.5 or > 7.0 meq/l
- Sodium: < 128 or > 150 meq/l

- Hemoglobin: < 9.5 g/dl
- Hematocrit: < 33 or > 71%
- Platelets: < 50,000 or > 916,000
- WBC: < 4,000 or > 35,000
- CSF cell count 1. WBC > 30 cells /ul

2. *Malignant cells and Intracellular organisms*(First time only per admission).

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**NOTE:** Contact Department of Pathology for critical value references.
8/2000; 10/2001; 8/04; 11/10; 3/15; 10/15
<criticalvalues-ped>
IV. BLOOD BANK/TRANSFUSION SERVICE

The HackensackUMC Blood Bank/Transfusion Service is responsible for, but not limited to, the following:

- Rapid response to urgent requests for blood products
- Provision of uncrossmatched red blood cells when requested
- Assurance that required pre-transfusion samples meet acceptability criteria for testing
- Accurate performance and reporting of all tests
- Provision of suitable blood products, upon physicians order
- Safe storage, handling and issue of blood products
- Communication with care providers, donor centers, suppliers and vendors
- Assurance of the following turnaround times for the provision of products that are requested stat:

<table>
<thead>
<tr>
<th>Red Blood Cells</th>
<th>* Fresh Frozen Plasma</th>
<th>* Platelets</th>
<th>* Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 minutes if Type and Screen is needed</td>
<td>Single Units 35 – 45 minutes</td>
<td>Irradiated 25 minutes</td>
<td>20 minutes</td>
</tr>
<tr>
<td>10 minutes if type and screen is complete</td>
<td>Double Units 45-60 minutes</td>
<td>Non irradiated 15 minutes</td>
<td></td>
</tr>
<tr>
<td>* longer time needed if clinically significant antibody is present or historical or if irradiation is required</td>
<td>Batch (4) of single units 60 minutes</td>
<td>Concentrated (pediatrics) 2 1/2 hours</td>
<td>longer time needed if irradiation is required</td>
</tr>
</tbody>
</table>

*Assuming valid blood type available

- Maintenance of an available inventory of blood products designed to meet the needs of the majority of patients. Some products, including but not limited to, HLA matched or crossmatched platelets, deglycerolized red blood cells, washed red blood cells, IgA deficient plasma, and granulocytes are not readily available, and longer time is needed to procure these products.

- Provision of CMV or specific antigen negative products and irradiated products when indicated.

The Transfusing Clinical Areas are responsible for, but not limited to, the following:

- Provision of a pre-transfusion patient sample, collected and labeled according to standard operating procedure
- Provision of the appropriate blood product orders based on clinical conditions and established utilization criteria
- Inclusion, if applicable of special transfusion requirements with every order
- Communication with the Transfusion Service in situations that warrant it, i.e., massive transfusion protocol (MTP), emergency uncrossmatched requests, or any situation where it may be warranted.
- Patient informed consent for transfusion
- Completion of the transfusion record, and notification to the transfusion service of any suspected transfusion reaction or other potential adverse effects

A. Ordering Blood

Blood and blood products should be ordered through the hospital computer system. The order must be based on the written request of a physician, or a verbal order to a professional registered nurse followed by physician countersignature within 24 hours as per hospital policy (Administrative Policy Manual, Policy 529: Verbal or Telephone Orders). The appropriate orders must be placed in the computer, particularly in regard to the nature of the blood or component required and the time it is needed. The retrieval form will print on the unit when the transfuse order is completed. A retrieval form is necessary to obtain from the Blood Bank any blood product for transfusion.

B. Blood Bank Specimen Collection and Labeling
   (See Administrative Policy 1402-1: Identification of Patients)

Blood Bank specimens must be labeled at the patient bedside or collection chair at the time the specimen is drawn, and not deferred until a later time, in a 10 ml purple-top vacutainer tube. The information on the specimen label must match the patient identification bracelet EXACTLY.

A Blood Bank specimen label must have the following information:

1. Patient identification:
   a. Patient name (exactly as written on the ID bracelet) and medical record number,
   b. for Code 55 ONLY – Contact Serial Number (CSN)
2. Date and Time of collection.
3. A legible signature and/or printed name and/or hospital provider identification number of the individual who drew the specimen and
4. A second legible signature and/or printed name and/or hospital provider identification number of the person witnessing/verifying the drawing and labeling of the specimen.

NOTE: Blood Bank specimens received in the Blood Bank without this procedure being followed will be discarded and the blood draw must be repeated.

The use of preprinted labels is deemed acceptable by the NJ State Department of Health and Senior Services as long as it contains the same information as the patient’s ID bracelet.
Therefore, areas that have the capability of generating computer labels may use them to label blood bank specimens. If the computer label does not differentiate the individual who drew the specimen from the witness/verifier, the name/code of the person who drew the specimen should be circled.

Blood Bank specimen labels for use by collecting sites are also available from Distribution. This label has pre-printed “prompts” (Name, Drawn by, Verified by, Date and Time) for ease of use.

**Protocol for Obtaining Second Blood Bank Specimen**  
(See Administrative Policy 1402-1: Identification of Patients)

1. Patients who have a blood bank specimen drawn for Type and Screen or Type and Cross match without a historical type present in the blood bank computer system will be requested to have a second confirmatory ABO/Rh type drawn.

2. This protocol will be followed on all patients with the exception of the following:  
   - All Type O patients (Rh positive and negative)  
   - Neonatal patients receiving O blood  
   - Ambulatory Outpatient specimens where Type and screen is ordered

3. Emergency cases/ Traumas and all cases where blood is being required emergently and a second specimen has not been drawn, O negative blood (O positive in times of shortages) will be dispensed until the second specimen is received and worked up in the Blood bank. At this point type specific blood may be dispensed.

4. Upon discovering that an historical type is not present in the blood bank computer system, the blood bank tech will call the floor to inform the nurse of the need for the second specimen. The floor nurse will place the order (as per individual order protocol) for the second specimen under “ABORH CHECK” in EPIC and arrange for the stat draw. Physicians will receive a request for co-signature of this order placed by the nurse. All second specimen tubes will be 2mL pink top tubes which can be obtained from distribution. This second specimen must be drawn by a different person from the first specimen.

5. All hospital policies for Blood Bank specimens must still be followed for the second Blood Bank specimen including the second verifier signature.

6. If a discrepancy is found, the Blood Bank will request a third and possibly a fourth sample to resolve the discrepancy.

**C. Trauma or Downtime Numbers**

Blood cannot be crossmatched for any patient who does not have a hospital identification bracelet on their wrist bearing the patient's name and hospital number. If such information is not available, the bracelet must bear a Contact Serial Number (CSN) or downtime
identification number. This number is to be used on all orders in accordance with AABB regulations. As soon as the critical period is over, a bracelet with the patient name and medical record number should be placed on the patient’s wrist. **DO NOT REMOVE THE ORIGINAL BRACELET EVEN WHEN THE REGULAR BRACELET IS ATTACHED UNTIL ALL REQUESTS BEARING THIS NUMBER ARE NO LONGER PERTINENT.**

D. Blood Requests for Surgical Procedures

1. **Type and Crossmatch for Blood for Surgery**

   All blood transfusion orders for scheduled surgical procedures should be received by the Blood Bank as soon as possible, preferably the day before surgery, to allow ample time for antibody identification and preparation of blood.

2. **Type and Screen**

   ABO group, Rh type and antibody screening should be ordered the day prior to surgery. The "type and screen" will be performed. If blood is needed STAT on patients who have been typed and screened, it will be available within ten to fifteen minutes (assuming no antibodies are present) following an immediate spin or electronic crossmatch, based on what is appropriate for the patient.

E. Antibody Detection and Identification

   Antibodies detected in the performance of Blood Bank testing will be identified for Blood Bank purposes to facilitate the procurement of compatible blood. Delays in blood procurement caused by the detection of unexpected antibodies will be promptly communicated to the patient’s physician and the patient care unit.

F. Emergency Blood Transfusion Orders

   If there is no time for a crossmatch, an **Emergency Blood Release Form (L-011)** properly completed and signed by the physician, should be sent to the Blood Bank. It is preferable that the recipient be given blood of his specific group and type. Grouping and typing takes a minimum of 15 minutes. If there is sufficient time for this, the M.D. should check the **group and type specific** box on the form.

   If there is insufficient time for grouping and typing, the **GROUP O (UNIVERSAL DONOR)** box should be checked and O negative blood will be released as packed cells in conformance with AABB standards. Additionally, if blood of the specific group and type is not available, GROUP O negative blood will be substituted.

   If the GROUP O box is checked, but the group and type of the recipient have been determined by the Hackensack University Medical Center Blood Bank, blood of that specific group and type will be released.

   In any event, the crossmatch will be set up in the usual manner and completed while the
patient is receiving the blood. ANY DISCREPANCIES WILL BE IMMEDIATELY COMMUNICATED TO THE PHYSICIAN IN CHARGE.

G. Administration of Blood/Blood Products

BLOOD CANNOT BE ADMINISTERED WITHOUT A WRITTEN ORDER. If least incompatible blood must be given to a patient, the order must read "transfuse least incompatible blood".

Blood administration is the responsibility of the House Staff or nursing personnel.

The Blood Bank "retrieval form" must be signed by an RN and presented to Blood Bank personnel to obtain a unit of blood and/or blood components for administration by House Staff or nursing personnel.

When blood is released from the Blood Bank, it is accompanied by the transfusion tag. After proper patient identification been made by comparing the information on the transfusion tag with the patient bracelet I.D., the transfusion may be started.

IMPORTANT: The transfusion tag must be signed by the transfusionist and verified by a second party.

When the transfusion is completed, the remaining infusion data should be recorded on the transfusion tag and placed in the patient’s chart. This constitutes Blood Bank evidence, as required by law, that the transfusion was given.

RhoGam is obtained from the Blood Bank and is administered by the ordering physician or a member of the House staff.

H. Transfusion Reactions

In the event of any untoward reaction during a transfusion, the nurse in charge is to follow the procedure on the Transfusion Tag.

I. Releasing Blood Products

Blood is released at 1:00 AM daily. AABB standards require that repeat crossmatches be performed at intervals of 72 hours using a fresh sample of the patient's blood. In practice, this necessitates re-crossmatching every fourth day. Blood ordered will be held for four (4) calendar days unless the requisition specifies a shorter period of time.

V. CYTOLOGY SPECIMENS

The Cytopathology section processes specimens for the detection of cancer, infection and other diseases. The Cytopathology Section is located in the Pathology Department on the first floor of the Patient Pavilion. The telephone number is 201-996-4852. The laboratory
is open for receiving specimens between the hours of 8:00 AM to 4:30 PM, Monday through Friday, except for holidays. Specimens received at other times will be accepted in the Stat Laboratory and held for processing on the next working day.

REMEMBER:

- **ALL CYTOLOGY SPECIMENS MUST BE PROPERLY LABELED.**
  All specimens must be labeled with two patient identifiers – patient’s full name and one other unique patient identifier such as medical record number, date of birth or requisition identification sticker.

- **A REQUISITION MUST ACCOMPANY EACH CYTOLOGY SPECIMEN**
  A specimen requisition may be created by entering an order into the Epic system or completing a TotaLab requisition form.

- **ALL REQUISITIONS MUST INCLUDE PATIENT NAME, DATE OF BIRTH, COLLECTION DATE, ORDERING CLINICIAN, THE INDICATION FOR THE TEST OR ICD-9 CODE, PERTINENT CLINICAL HISTORY AND SPECIMEN SOURCE.**

- **WRITE SPECIMEN SOURCE ON CYTOLOGY SPECIMEN LABEL** as a double check for the source that has been entered into the computer system.

Unfixed specimens should be sent to the laboratory only during the receiving hours. Prompt handling of unfixed material is necessary to prevent degeneration of the exfoliated cells which renders the specimen unsatisfactory. Unfixed material should be submitted to the laboratory within minutes after being obtained.

NOTE: The pathologist may order additional stains as necessary for diagnosis

A. **Body Cavity Fluid Specimen Collection:**
Test includes routine evaluation of thin-preparation slides and cell blocks and/or special stains when indicated.

Specimen Collection: Collect fluid in container(s). Clearly label container with patient’s name and medical record number. Write specimen source on container label. Recommended minimum amount of fluid for cytologic studies is 50-200 ml. Cells can be examined from any volume of fluid but higher volumes of fluid yield better results.

Fixative: Anticoagulant recommended for bloody or proteinaceous fluid. Specifically, fluid should be placed in container with 3 units for every 1ml of fluid collected.

Transport specimen and requisition to Cytology Laboratory immediately. If a delay is unavoidable, refrigerate the specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

*Note:* If clinically suspicious for a lymphoproliferative disorder (leukemia/lymphoma), it is recommended that fluid be submitted for flow cytometry analysis. Refer to the Special Diagnostic Immunology manual for collection requirements.

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B. Nipple Discharge Specimen Collection:

Patient preparation: Physician performs procedure

Specimen Collection: Express secretion by gently compressing the areola area between the thumb and index finger, first vertically then in a clockwise direction to include the total area. Allow a small drop of fluid to accumulate on the nipple. Touch glass slide to secretion several times. Invert another slide over the specimen. As the specimen spreads, gently pull the two slides apart horizontally. IMMEDIATELY drop the slides into 95% alcohol or spray IMMEDIATELY with cytology spray fixative. Do not allow cells to air dry. Label slides in pencil with patient’s name and 2nd identifier such as date of birth or medical record number.

Transport specimen and requisition to Cytology Laboratory as soon as possible. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

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C. Cerebrospinal Fluid Specimen Collection:

Test includes routine evaluation of thin-preparation slides and special stains as indicated.

Patient preparation: Physician performs procedure

Specimen Collection: Collect fluid in container(s). Clearly label container with patient’s name and medical record number. Write specimen source on container label. Cells can be examined from any volume of fluid but higher volumes of fluid yield better results.

Transport specimen and requisition to Cytology Laboratory IMMEDIATELY. If a delay is unavoidable, refrigerate the specimen or added equal volume of Cytolyt to specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

Note: If clinically suspicious for a lymphoproliferative disorder (leukemia/lymphoma), it is recommended that fluid be submitted for flow cytometry analysis. Refer to the Special Diagnostic Immunology manual for collection requirements.

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D. Colonic Brushing Specimen Collection:

Test includes routine evaluation of thin-preparation slides and special stains when indicated.

Patient preparation: Physician performs procedure

Specimen Collection: Agitate brush vigorously in container of Cytolyt Preservative to dislodge cells. Note: Cytolyt solution contains methanol and should never come in direct contact with the patient. Clearly label container with patient’s name and medical record number. Write specimen source on container label.

Transport specimen and requisition to Cytology Laboratory. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.
E. Direct Scraping Specimen or Tzanck Smear Collection (Skin and Mouth):

Test includes routine evaluation of smears and special stains when indicated.


Specimen Collection: Scrape lesion with spatula. If the lesion is moist, scrape the entire surface of the lesion with the spatula. If lesion is dry or has a necrotic and inflammatory surface, gently moisten and remove necrotic debris with gauze that has been moistened with water or saline. Allow gauze to remain in place for several minutes. Scrape lesion several times in same direction. Spread the scraping uniformly on glass slide and spray IMMEDIATELY with spray fixative. **Do not allow the slides to air dry.**

Transport specimen and requisition to Cytology Laboratory as soon as possible. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

F. Esophageal and Gastric Brushing Specimen Collection:

Test includes routine evaluation of thin-preparation slides and special stains as indicated.


Specimen Collection: Agitate brush vigorously in container of Cytolyt Preservative to dislodge cells. **Note: Cytolyt solution contains methanol and should never come in direct contact with the patient.** Clearly label container with patient’s name and medical record number. Write specimen source on container label.

Transport specimen and requisition to Cytology Laboratory. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

G. Fine Needle Aspiration Specimen Collection:

Test includes routine evaluation of thin-preparation slides or prepared smears and cell block and/or special stains as indicated.

To ensure optimal numbers of adequate cells on a palpable or deep seated organ, the presence of a Cytopathologist/Cytotechnologist is recommended. If the specimen is not palpable, the aspiration should be performed under radiologic methods. **Schedule the procedure** with the Cytology Section (ext. 4852) at least one day in advance.

Patient preparation: Physician performs the procedure.

Specimen Collection: Specimen is collected with a needle and syringe. Clean skin around palpable mass with alcohol. Hold mass with free hand and insert the needle. Pull on plunger to create negative pressure. Move needle back and forth at slightly different angles.
Observe junction of the needle and syringe for appearance of any material. Release plunger, then withdraw the needle and place pressure on the puncture site with a sterile gauze. Disconnect needle from syringe. Fill syringe with air and reconnect to needle. Express a drop of material onto a glass slide. Place second slide on top of first, allowing weight of slide to spread drop; then pull slides apart horizontally. Immediately spray with fixative or immerse in 95% alcohol. Also, the contents of needle and syringe may be flushed by aspirating Cytolyt solution from cup of Cytolyt. Express cytolyt back into cup. Note: Cytolyt solution contains methanol and should never come in direct contact with the patient. Dispose of needle in proper container. Label slides and/container with patient’s full name and second identifier. Write specimen source on container.

Send slides, cytolyt and requisition to Cytology Laboratory as soon as possible.

H. Pap Smear Specimen Collection:

Cytologic examination of cells from the cervix and vagina has been shown to reduce the risk of death from cancer due to the detection of otherwise occult precancerous and early cancerous lesion. The ThinPrep Pap Test (a much-improved monolayer method) is the laboratory’s preferred method for Pap Smear collection. High risk HPV testing can be run off the fluid remaining in the vial after the pap smear has been prepared.

The requisition should always include all of the following information: Name, date of birth, patients' address, age, source of specimen, date of specimen collection, last menstrual period, history of abnormal paps or biopsies, history of abnormal bleeding, presence of discharge, hormonal therapy, pregnancy, nursing and any other relevant data. Patients at increased risk for cervical cancer should be identified as such on requisition slip.

Patient preparation: The best time to collect the Pap smear is two weeks after the first day of the last menstrual period. The patient should be instructed not to use vaginal medications, spermacides or douches 48 hours prior to collecting the pap smear. The patient should refrain from intercourse 24 hours prior to the collection of the pap smear.

Preparation of Cervix: Lubricate the speculum with warm water. Do not use lubricant jelly because it can obscure cellular material making cytologic evaluation difficult. A sample from the transformation zone is the primary target for representative sampling of the cervix by the "Pap" smear technique. It is in the transformation zone that the vast majority of squamous epithelial abnormalities (cancerous and pre-cancerous) of the cervix arise. Remove excess mucus, blood or inflammatory material gently with a dry gauze.

ThinPrep Method (monolayer processing from vial) – Specimen collection:

A. Collection with broom device:

1. Sample the exocervix and endocervix by inserting the central bristle of the broom collection device into the endocervical canal deep enough to allow the shorter bristles to fully contact the ectocervix. Push gently and rotate the broom in a clockwise direction five times.
2. Rinse the broom into the ThinPrep vial by pushing the broom into the bottom of the vial
10 times, forcing the bristles apart. As a final step, swirl the broom vigorously to further release material.
3. Discard the broom.
4. Tighten the cap so that the torque line on the cap passes the torque line on the vial.
5. Label the vial with patient’s full name and second patient identifier.
6. Complete requisition form and place both in a specimen bag for transport to the laboratory.

B. Collection with spatula and endocervical brush:

1. Sample the exocervix using a spatula.
2. Rinse the spatula immediately into the ThinPrep vial by swirling the spatula vigorously in the vial 10 times. Discard the spatula.
3. Sample the endocervix using an endocervical brush. Insert the brush into the cervix until only the bottom fibers of the brush are visible. Slowly rotate the brush one-half turn in one direction taking care not to over-rotate.
4. Rinse the brush immediately into the ThinPrep vial by rotating the brush in the solution ten times while pushing against the vial wall. Swirl the brush vigorously to further release any material. Discard the brush.
5. Tighten the cap so that the cap passes the torque line on the vial.
6. Label the vial with patient’s full name and second patient identifier.
7. Complete requisition form and place both in a specimen bag for transport to the laboratory.

**NOTE:** The brush/broom should NOT be left in the vial.

**Conventional Method (Slide) – Specimen collection:**

1. Sample the exocervix with a spatula. Have the nurse or assistant hold this spatula.
2. Sample the endocervix using an endocervical brush. Insert the brush into the cervix until only the bottom fibers of the brush are visible. Slowly rotate the brush one-half turn in one direction taking care not to over-rotate. (The cytobrush should not be used on pregnant patients).
3. Upon removing this device, immediately smear the endocervical specimen contained on the cytobrush on the section of the slide farthest from the frosted end by a uniform rolling motion; then take ectocervical specimen contained on spatula second half of the slide closest to the frosted end.

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**I. Respiratory Specimen Collection:**

Test includes routine evaluation of thin-preparation slides and special stains as indicated.

**NOTE:** As the findings at bronchoscopy are usually not predictable beforehand, the physician may obtain material by any means which may prove to be the most desirable at the time of examination. Specimens may be obtained by Wang
needle aspiration, direct smears of suspicious areas and bronchial washings.

**WANG NEEDLE ASPIRATIONS**

The Cytology Section may assist at Wang needle aspirations. Schedule the procedure with Cytology (X4852) at least one day in advance.

Specimen Collection: Express aspirated fluid onto glass slide that has been labeled with patient’s name and medical record number. Gently cover with another slide and smear. Drop slide(s) IMMEDIATELY in 95% alcohol fixative. Rinse needle in purple top tube containing a small amount of saline. Label tube with patient’s name and medical record number. Note specimen source on requisition AND on specimen container

Transport specimen and requisition to Cytology Laboratory as soon as possible. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

**DIRECT BRUSHINGS**


Specimen Collection: Rotate brush gently but rapidly on clean glass slide labeled with patient’s name and medical record. Drop slide immediately in 95% alcohol fixative. Rinse brush vigorously in a 15 ml bottle of balance salt solution. Note side of procurement on requisition AND on specimen container

**BRONCHIAL WASHING / BRONCHOALVEOLAR LAVAGE (BAL)**


Specimen Collection: Collect specimen in clean container. Clearly label container with patient’s name and medical record number. Write specimen source on container label.

Transport specimen and requisition to Cytology Laboratory as soon as possible. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

NOTE: For specimens requiring a Grocott methenamine silver stain (GMS) to rule out the presence of *Pneumocystis carinii* organisms, you must indicate RUSH or STAT on the requisition if results are needed the same day. Also include a beeper or phone number at which we may call the clinician with results. Enter R/O *Pneumocystis carinii* in comments section.

**J. Sputum Specimen Collection:**

Test includes routine evaluation of thin-preparation slides and special stains when indicated.

Patient preparation: None.
Specimen Collection: Submit deep cough fresh specimen in container. Label container with patient’s name and 2nd patient identifier such as date of birth. To increase the yield of diagnostic cells, specimens should be obtained by an early morning, deep cough for three consecutive.

Transport specimen and requisition to Cytology Laboratory as soon as possible. If a delay is unavoidable, refrigerate the specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

K. Urine Specimen Collection:

Test includes routine evaluation of thin-preparation slides and special stains as indicated.

Urinary cytology is useful in diagnosing diseases that involve the mucosal surface. Knowing the type of exfoliated urinary tract specimen is essential. Therefore, the requisition should also include whether the specimen is voided, catheterized or a bladder washing.

VOIDED SPECIMENS – Avoid early morning specimens as the cells undergo degenerative changes, making cytologic diagnosis difficult. The minimum amount of urine necessary to ensure adequate cellularity is unknown, but it may be as high as 25-100ml. In women, voided urine may be contaminated by vaginal cells and a mid-stream (clean catch) specimen is recommended.

Patient preparation: Clean urethral area.

Specimen Collection: Collect mid stream urine in container. Clearly label container with patient’s name and second patient identifier. Write source on container. Transport specimen and requisition to Cytology Laboratory as soon as possible. If a delay is unavoidable, refrigerate the specimen. Alternately, specimen may be mixed with an equal volume of CytoLyt Preservative. Note: CytoLyt solution contains methanol and should never come in direct contact with the patient. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

CATHETERIZED SPECIMENS

Patient preparation: Clean urethral area.

Specimen Collection: Collect urine in container. Clearly label container with patient’s name and second patient identifier. Write source on container.

Transport specimen and requisition to Cytology Laboratory as soon as possible. If a delay is unavoidable, refrigerate the specimen. Alternately, specimen may be mixed with an equal volume of CytoLyt Preservative. Note: CytoLyt solution contains methanol and should never come in direct contact with the patient. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

BLADDER WASHINGS
Patient preparation: Physician performs the procedure.

Specimen Collection: Collect urine in container. Clearly label container with patient’s name and second patient identifier. Write source on container.

Transport specimen and requisition to Cytology Laboratory as soon as possible. If a delay is unavoidable, refrigerate the specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

L. Pelvic Washings

Test includes routine evaluation of thin-preparation slides and special stains as indicated.


Specimen Collection: Collect fluid in container(s). Clearly label container with patient’s name and medical record number. Write specimen source on container label.

Transport specimen and requisition to Cytology Laboratory as soon as possible. If a delay is unavoidable, refrigerate the specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

M. Vitreous fluid

Test includes routine evaluation of Thin-preparation slides and special stains as indicated.


Specimen Collection: Collect fluid in container(s). Clearly label container with patient’s name and medical record number. Write specimen source on container label. Cells can be examined from any volume of fluid but higher volumes of fluid yield better results.

Transport specimen and requisition to Cytology Laboratory IMMEDIATELY. If a delay is unavoidable, refrigerate the specimen. Specimens may be sent to the Stat Lab accessioning area when the Cytology section is closed.

VI. MICROBIOLOGY SPECIMENS

NOTE: Identification and susceptibility testing by minimum inhibitory concentration (MIC) or disk diffusion test (Kirby-Bauer) will automatically be performed on all cultures that are positive for pathogenic organisms where standards exist.

A. BLOOD CULTURES

The prompt and accurate isolation and identification of the etiological agents of bacteremia
and fungemia remain among the most important functions performed by the clinical microbiology laboratory.

**Ordering Practices:**
1. **No less than 2 sets** of blood cultures should be ordered. Each set typically consists of an aerobic bottle and an anaerobic bottle inoculated with blood from a single stick. No more than 1 set (2 bottles) should be inoculated from that single stick.  
   **Why?** Blood culture contamination with Staph (coag neg), even with good technique, is not uncommon. Collecting a minimum of 2 sets of cultures on separate sticks helps identify when a contaminant is present.

2. **Draw 4 sets when endocarditis is suspected**, using 4 separate sticks. Draw the 4 culture sets over 2 separate days when antibiotics are not given immediately or draw the 4 cultures 30 minutes to an hour apart on the same day when antibiotics are to be given that day.  
   **Why?** Most studies in literature indicate that between 2 or 4 culture sets are sufficient to diagnose endocarditis

3. Draw 2 to 3 sets for all other cases of suspected sepsis using 2 or 3 separate sticks.  
   **Why?** For cases of suspected septicemia, 2 or 3 sets each drawn on separate occasions are sufficient to detect bacteremia.

4. **Time:** Draw blood cultures at any time of day but not necessarily in relation to fever. Do not write an order to draw blood culture for temperatures over 101° F (or any other figure); order them to be done when you suspect sepsis.  
   **Why?** When cultures are ordered in relation to a fever, they often don’t get drawn. If infection is suspected, draw the culture then. Bacteremia probably occurs just before the fever develops. That point is impossible to predict.

5. When trying to document persistent bacteremia after initial positive cultures, draw no more than 2 culture sets using 2 separate sticks.  
   **Why?** Once bacteremia has been documented, you only need to draw 2 sets to prove it has cleared. If already negative, draw no more.

6. Draw none when the fever persists, when the initial 4 sets of blood cultures drawn over 2 or more days are negative, or when there is no change in the patient’s clinical status.  
   **Why?** When the initial blood cultures are negative and the patient’s clinical status is unchanged, additional cultures are unlikely to be positive.

Questions should be directed to: Tao Hong, PhD (Director of Microbiology), ext. 4854; Frank Hollis (Microbiology Section Head), ext. 4859.

**Order as:** Culture, Blood - Microbiology Screen  
**Patient Preparation:** None  
**Specimen Collection:**

Step 1: **For adults and children > 2 months of age**  
Venipuncture site is cleansed with a chlorhexidine preparation for 30 seconds using an up and down, side to side scrub procedure. Let dry for 30 seconds.  
**NOTE:** The culture bottle stopper(s) must also be cleansed with a 70% alcohol prep. Do not touch the cleansed venipuncture site with finger.
For children < 2 months of age
Venipuncture site is cleansed with iodophor. Let iodophor remain for 1 minute. The site is then swabbed from the center to the periphery with a 70% alcohol (isopropyl or ethyl). Blot the site dry with sterile gauze. NOTE: The culture bottle stopper(s) must be cleansed with iodophor and a 70% alcohol prep. Do not touch the cleansed venipuncture site with finger.

STEP 2:
**Adult:**
OPTIMAL draw: 8-10 ml of blood per 40 ml bottle
MINIMUM draw: 3 ml of blood per 40 ml bottle

**Pediatric/adult low-volume draw:**
OPTIMAL draw: 1-3 ml of blood per 20 ml bottle
MINIMUM draw: 0.5 ml of blood per 20 ml bottle

Notes:
1. Literature review states that high volume blood draw increases positive yield.
2. For suspected sepsis, draw two to three sets from separate sticks. For suspected endocarditis, draw 3-4 sets from separate sticks. No more than two sets from separate sticks are required to document clearance of bacteremia.

STEP 3: Send labeled specimen(s) and computer generated form immediately to the laboratory.

**Stat?:** No, Drawn Stat only.

**Weekends/Holidays:** Yes

**Turnaround Time:**
- **Preliminary Report:** Issued after 1, 2, 3, 4 days of incubation.
- **Final Report:** Negative culture - Incubated for 5 days before being reported as negative.
- **Final Report:** Positive culture - When growth of an organism is observed it is reported immediately to the nurse in charge of the patient (in-house) or the physician’s office (outpatients).

**Interpretation:** Normal - no growth.

B. CULTURES FOR ROUTINE BACTERIA

**Body fluids** (Pleural, peritoneal, pericardial, synovial fluids)

Specimens such as these are usually collected via percutaneous needle aspiration. It is essential that the overlying skin be disinfected thoroughly before the aspiration is performed and that the collection procedure itself be done by strict aseptic technique. Since the concentration of organisms in fluid may be low, there is the absolute need to collect and submit as large a specimen sample as possible. Specimens that may clot due to presence of blood or fibrin should be submitted in heparinized bottles.

**Order as:** Culture (body fluid)
**Patient Preparation:** None
**Specimen Collection/Minimum Amount:** Approximately 50ml in a sterile heparinized
bottle. **Transport directly to Microbiology Section.**

Stat?: no
Weekends/Holidays: yes

**Turnaround Time:**
- Preliminary Report on positive cultures - 24 hours.
- Final Report - Approximately 24-96 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: No growth

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**Catheters**

Intravascular catheters are an important potential source of bacteremia and fungemia as well as local infectious complications at sites of catheter insertion. A 2 inch distal segment of catheter should be submitted by aseptically clipping off the end of the catheter directly into a screw cap, large mouth sterile container at the time the catheter is removed. **Foley catheter tips are unsatisfactory specimens for culture.**

**Order as:** Culture (catheter)
**Patient Preparation:** None
**Specimen Collection: Minimum Amount:** Place catheter tip in sterile container. Bring immediately to laboratory.

Stat?: no
Weekend/Holidays: yes

**Turnaround Time:**
- Preliminary report on positive cultures - 24 hours.
- Final report - Approximately 24-72 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: Negative

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**CSF**

Lumbar punctures must be performed under conditions of strict asepsis, since contamination of the specimen can occur readily and confuse the identification of the etiologic agent. The skin should be disinfected with povidone-iodine. Specimens should be collected in sterile containers that can be sealed with a screw cap to preclude leakage and loss or contamination of the contents. Deliver specimen immediately to the laboratory.

**Order as:** Culture (CSF)
**Patient Preparation:** None
**Specimen Collection: Minimum Amount:** 2-3 ml in a sterile screw-top tube.

Transport specimen directly to the Microbiology Section (day shift) or the Stat Lab (evening and night shifts).

Stat?: Yes
Weekend/Holidays: Yes

**Turnaround Time:**
- Preliminary report on positive cultures - 24 hours.
**Final Report** - 1-5 days depending on organism isolated, may take longer.

**Interpretation:** Normal: Negative

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**Ear**

A dry culture swab (either cotton or synthetic fiber) may be used to swab the affected area or drainage. Since this area has normal indigenous flora, one should be careful when obtaining the specimen. When drainage occurs, allow the swab to absorb the secretions. For the diagnosis of a middle ear infection, one should perform a tympanocentesis.

**Order as:** Culture (ear)

**Patient Preparation:** none

**Specimen Collection: Minimum Amount:** Swab affected area

**Stat?**: no

**Weekend/Holidays:** yes

**Turnaround Times:**

- **Preliminary report on positive cultures** - 24 hours
- **Final report** - Approximately 24-72 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: Non significant flora

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**Eye**

Patients with ocular infections present specimen problems with respect to specimen collection and processing. Swabs are often inadequate because of the small sample size. In addition, the antimicrobial activity of topical anesthetics used when procuring eye specimens may interfere with the culture. It is therefore recommended that swabs for culture be taken before topical anesthetics are applied and that corneal scrapings be taken after they are applied. Because of the limited amount of material available, it is recommended that scrapings be inoculated at the time of procurement directly onto appropriate media.

**Order as:** Culture (eye)

**Patient Preparation:** None

**Specimen Collection: Minimum Amount:** Swab affected area with culturette

**Stat?**: no

**Weekend/Holidays:** yes

**Turnaround Time:**

- **Preliminary report on positive cultures** – 24 hours.
- **Final report** - 24-72 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: Non significant flora

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**GC Culture**

**Order as:** GC Culture

**Patient Preparation:** None

**Specimen Collection: Minimum Amount:** Urethral or cervical area swabbed with a
culturette or streaked directly onto chocolate plate or MTM (GC select agar). Bring immediately to the Laboratory.

Stat?: No
Weekend/Holidays: Yes
Turnaround Time: 2 - 4 days
Interpretation: Normal - Negative for GC

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**Genital**

The major concern with this source is gonorrhea. In males, the microscopic observation of intracellular diplococci resembling gonococci in a gram stained smear of a urethral discharge is diagnostic. Obtaining an adequate specimen in female patients may present greater problems. The presence of a cervical discharge is helpful in the diagnosis. However, the gram stained smear obtained from such a discharge cannot be considered pathognomonic for gonorrhea, and cultures must be performed. Direct inoculation of Neisseria selective medium, i.e., Thayer-Martin (TM) medium or its modification is advisable when inoculated agar can be transported to the laboratory immediately. Bacterial vaginosis is associated with a thin, watery vaginal discharge, vaginal fluid pH of greater than 4.5, the presence of aromatic amines in vaginal secretions, and the appearance of clue cells in the vaginal discharge. Diagnosis is based on these characteristics of the discharge. Cultures for bacterial vaginosis are of little value. Cultures for **Group B streptococcus (GBS)** are significant for prenatal care. GBS colonization status should be determined by collecting both vaginal and rectal specimens at 35 to 37 weeks gestation. A single combined vaginal-rectal specimen can be collected. Cervical, perianal, perirectal, or perineal specimens are NOT acceptable, and a speculum should NOT be used for culture collection, per 2010 CDC guidelines. (Revised: 7/2012)

**Order as:** Culture, genital or Culture, genital group B
**Patient Preparation:** None
**Specimen Collection:** swab affected area with culturette; vaginal/rectal for GBS.
**Stat?:** no
**Weekend/Holidays:** yes
**Turnaround Time:**
  - Prelim. report on positive culture: 24 hours
  - Final report: 24-72 hours depending on organism isolated; may take longer).
**Interpretation:** Normal: Non significant flora.
  Normal: No Group B streptococcus isolated.

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**Lower Respiratory Tract**

**Bronchial**

**Order as:** Culture bronchoscopy specimen
**Patient preparation:** None
Specimen Collection: Pulmonologist-guided procedure. Specimen may be collected as a lavage or wash depending on preference.
Rejection Criteria: None
Stat?: No
Weekend/Holidays: Yes
Turnaround Time:
  - Preliminary report on positive cultures – 24 hours
  - Final report – 24-72 hours (depending on organism isolated)
Interpretation: Normal: Non-significant flora

Bronchial Quantitative

This is a special requested procedure that must be coordinated with a pulmonologist and the Microbiology lab. Please call ext. 4859 for details.

Order as: Culture Bronchial Lavage Quantitative
Patient Preparation: None
Specimen Collection: With the aid of a pulmonologist, the first aliquot (bronchial fraction) and the second aliquot (alveolar fraction) must be separated upon collection and placed in properly labeled individual specimen containers.
Rejection Criteria: None
Stat?: No
Weekend/Holidays: Yes
Turnaround Time:
  - Preliminary report on positive cultures – 24 hours
  - Final report – 24-72 hours (depending on organism isolated)
Interpretation:
  - Normal: Non-significant flora
  - Positive: Greater than 10 x 5 – 10 x 6 CFU indicates infective organisms
    - Less than 10 x 4 CFU indicates colonizing organisms

Sputum

Cultures of expectorated sputum for bacteria are fraught with error, and clear cut results are seldom obtained. Specimens should be fresh and clean, resulting from a deep cough. The specimen must be transported to the laboratory promptly. Expectorated sputum is frequently contaminated with oropharyngeal flora which make it difficult to determine which of the organisms isolated is responsible for pulmonary infection.

Order as: Culture (sputum)
Patient Preparation: None
Specimen Collection: Minimum Amount: Approximately 1-2ml. Should consist of material from a deep cough; saliva is not a satisfactory specimen. Collect in a dry, sterile container.
Rejection Criteria: Saliva contamination determined microscopically.
Stat?: No
Weekend/Holidays: Yes
Turnaround Time:
Preliminary report on positive cultures - 24 hours.
Final report - 24-72 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: Non significant flora

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**Nasopharyngeal**

Nasopharyngeal specimens should be obtained with a dacron, cotton, or calcium alginate swab on a flexible wire that is gently passed through the nose into the nasopharynx, rotated, removed and placed into a suitable transport medium for shipment to the laboratory. Bedside inoculation is advantageous especially for pertussis isolation.

**ROUTINE NASOPHARYNGEAL CULTURE**

**Order as:** Culture (nasopharyngeal)

**Patient Preparation:** None

**Specimen Collection:** Nasopharyngeal specimen on calcium alginate, cotton or dacron swab. Bring immediately to laboratory.

**Stat?**: No

**Weekend/Holidays:** Yes

**Turnaround Time:**
- Preliminary report on positive cultures - 24 hours.
- Final report - Approximately 24-72 hours (depending on organism isolated.)

**Interpretation:** Negative for pathogens

**NASOPHARYNGEAL MRSA CULTURE** - Nasopharyngeal cultures detect nasal colonization of methicillin resistant Staphylococcus aureus (MRSA) to aid in the prevention and control of MRSA infections in healthcare settings.

**Order as:** MRSA Screen Culture

**Patient Preparation:** None

**Specimen Collection:** Nasopharyngeal specimen on calcium alginate, cotton or dacron swab. Bring immediately to laboratory.

**Stat?**: No

**Weekends/Holidays:** Yes

**Turnaround Time:** Final report on positive cultures – 24 hours

**Final Report:** 48 hours

**Interpretation:** Negative for MRSA

**NASOPHARYNGEAL BORDETELLA PERTUSSIS PCR**

**Order as:** Bordetella pertussis PCR

**Patient Preparation/Specimen Collection/Minimum Amount:**

The acceptable specimen is: one extra fine nasopharyngeal swab.

Swab material should be Dacron or synthetic-polyester NP swab, calcium alginate swab is not acceptable (inhibitory to PCR).

To take the specimen, immobilize the patient’s head and gently pass the swab through the nostril into the nasopharynx. Immerse the swab completely into the tube containing the semisolid transport media. Leave the swab immersed in the
media for transport
Specimen must be brought directly to the Microbiology Section of the Pathology Lab.
Stat?: Yes. Please contact Microbiology at ext. 4859
Weekend/Holidays: Yes
Turnaround Time: 12 Hours
Interpretation: Positive or Negative for B. pertussis

Stool

Collection and preservation of feces is a frequently neglected but an important requirement for the isolation of microorganisms responsible for intestinal infections. Specimens should not remain on the floor for extended periods of time since certain organisms may not survive and may be overwhelmed by commensal enteric organisms. Stool for ova and parasites must be preserved in an EcoFix (green vial) system. This system provides for fecal concentration methods and permanent stained slide preparations. Stool for routine culture must be submitted in a Cary-Blair (orange vial) system. Cary-Blair acts as a preservative for recovery of low numbers of potential pathogens. Swabs may be used to obtain rectal specimens in selected circumstances. They should be passed beyond the anal sphincter, carefully rotated, and withdrawn. Patients or personnel responsible for obtaining stool specimens for laboratory analysis should be instructed explicitly to choose portions of the specimen that are most likely to reveal the infectious agent(s) (mucus, blood, pus, etc.) when present. A single negative stool culture or examination of ova and parasites cannot be regarded as sufficient for ruling out a particular gastrointestinal pathogen. Most infectious diarrheas will be diagnosed with careful and extensive evaluation of three stool specimens. Similarly, after an etiological diagnosis has been made, microbiological surveillance of the convalescent individual and of contacts who may have become a carrier should be conducted at regular intervals until at least three consecutive negative specimens have been obtained.

ROUTINE STOOL CULTURE

Order as: Culture (stool)
Includes: Routine screen includes: Salmonella, Shigella, and Campylobacter. Other pathogens by request only (Yersinia, Vibrio, Aeromonas, E. coli O157).
Patient Preparation: None
Specimen Collection: random preserved stool specimen (orange-capped vial)

1. For acute diarrhea caused by enteric pathogenic bacteria, one specimen is sufficient.
2. For chronic diarrhea caused by enteric pathogenic bacteria, 2 or 3 specimens collected on different days are recommended.
3. For patients who develop diarrhea after 3 days of hospitalization, stool culture and O&P are not recommended. Order C. difficile toxin analysis. The Microbiology Section will not perform stool culture and/or stool O&P analysis unless a negative C. difficile toxin analysis is documented.

Rejection Criteria: Specimens collected from patients after 3 days of hospitalization
will not be cultured without approval by the clinical pathologist or the Microbiology supervisor. Improperly collected/preserved specimens are also subject to rejection.

**Stat?: no**

**Weekend/Holidays:** yes

**Turnaround Time:**
- **Preliminary report on positive culture:** 48 hr
- **Final report:** Approximately 24-72 hours (depending on organism isolated, may take longer).

**Interpretation:** Normal: No enteric pathogens

**VRE STOOL CULTURE** – Stool specimens can be utilized to detect colonization of vancomycin resistant enterococcus (VRE).

**Order as:** Culture Stool VRE  
**Patient Preparation:** None  
**Specimen collection:** Random preserved stool specimen (orange vial). If patient cannot pass stool, a rectal swab or peri-rectal swab may be used.  
**Stat?:** No  
**Weekend/Holiday:** Yes  
**Turnaround Time:** 48 hours  
**Interpretation:** No VRE isolated.

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**Throat**

Throat cultures are performed to detect bacterial pharyngitis of which Group A beta-hemolytic streptococcus (GABHS) is the important pathogen. Aside from GABHS, other bacterial causes of pharyngitis include Group C and G beta-hemolytic streptococci, Neisseria gonorrhoeae, Corynebacterium diphtheriae and Arcanobacterium haemolyticum. However, most causes of pharyngitis have a viral etiology.

Throat cultures should be obtained by direct visualization with a dacron, cotton or calcium alginate swab. Both tonsillar areas, the posterior pharynx and any areas of inflammation, ulceration or exudation should be sampled. When present, a portion of pseudomembrane should be dislodged and submitted for culture. The tongue should be depressed with a tongue blade or spoon to minimize contamination of the swab with oral secretions detrimental to the quality of the specimen.

**Order as:** Culture (throat).  
**NOTES:** 1. Indicate specific organism if other than Group A streptococcus is suspected.  
2. Submit two (2) specimens if an organism other than GABHS is suspected.  
**Patient Preparation:** See above  
**Specimen Collection: Minimum Amount:** Swab affected area with culturette as above.  
**Stat?** no  
**Weekend/Holidays:** yes  
**Turnaround Time:**
Interpretation: Normal: No Beta-hemolytic streptococci detected. The detection of GABHS will be by nucleic acid amplification technology. Other suspected organisms may require additional intervention as indicated in the notes above.

Urine

Urinary tract infections may involve the kidneys, ureters, bladder and urethra, with the urethra and bladder being the most commonly affected. Proper instruction of women regarding the collection of clean catch, midstream specimens is critical to enhance the accuracy of results from culture. Instruction of nursing personnel in the proper methods for obtaining urine specimens from bedridden patients is also important. It has been shown in prospective studies of out-patients that meatal cleansing nor midstream sampling is usually necessary for obtaining urine specimens from men. It has also been shown that accurate culture can be obtained from incontinent males if a new, but non-sterile external catheter and drainage system are applied after the glans penis is cleaned with a povidone-iodine solution and the first voided specimen is collected from the drainage bag. Urine is an excellent growth medium for microorganisms. Specimens should be delivered to the laboratory and cultured within one hour unless they are refrigerated.

Contamination of the urine by urethral or introital bacterial flora may be avoided by suprapubic aspiration. It is indicated for patients with clinical evidence of urinary tract infection but in whom bacterial counts in clean-voided specimens are low and therefore indeterminate, in neonates and in young infants, in patients in whom catheterization may be contraindicated, and in those with suspected anaerobic bacteremia. The patient should have a full bladder at the time the procedure is performed. After the skin has been properly disinfected, a 19 or 20 gauge needle attached to a syringe is passed through in the midline at the point approximately one-third the distance from the symphysis pubis to the umbilicus. Urine is aspirated into the syringe. In patients with chronic indwelling urethral catheters attached to a closed drainage system, urine is collected for culture by disinfecting (with a suitable agent) the wall of the catheter at it's juncture with the drainage tube and puncturing it with a 21-gauge needle attached to a syringe for urine aspiration. The connection between the catheter and the drainage tube should not be broken for specimen collection, nor should material for culture be taken from the drainage bag. During the course of cystoscopy, urethral catheterization or retrograde pyelography urine may be collected for culture. In the case of an obstructed ureter, bladder urine may be sterile whereas the urine proximal to the obstruction may be infected; hence, the urologist will often collect several specimens and request that each be handled separately. Such localization studies require enumeration of any bacteria present in cultures.

Order as: Culture (urine)

Patient Preparation: none

Specimen Collection: Minimum Amount:
Approximately 25 ml in a Urine Complete Cup Kit, which is orderable from Distribution (PeopleSoft # 5104232). This kit contains a specimen cup with integrated transfer port and 2 vacutainer tubes: a gray top for Culture and Sensitivity (C&S) and a red/marble top for routine UA. Both tubes contain preservatives to maintain
specimen integrity. Fill both tubes from the cup to between the Minimum (Min) and Maximum (Max) lines on the tubes, however, only the ordered tests will be performed unless otherwise indicated. Dispose of the Blue cup LID ONLY in a sharps container on the unit. Send only the tubes to the Lab - Do not send the cup.

NOTES:
(1) ANY URINE PROCEDURE OTHER THAN A ROUTINE UA or C&S SHOULD BE SENT IN A STERILE SPECIMEN CUP (PeopleSoft # 854000) or AN UNPRESERVED URINE VACUTAINER TUBE (PeopleSoft # 5104233). Both are orderable from the Storeroom.
(2) While urine preservative collection devices are preferable, Microbiology will accept approximately 25ml in a sterile urine container. Urine should be cultured within 1 hour of collection. If this is not possible, the specimen must be refrigerated.

Stat?: no
Weekend/Holidays: yes
Turnaround Time:
  Preliminary report on positive culture – 24 hours
  Final report - Approximately 24-72 hours (depending on organism isolated, may take longer).
Interpretation: Dependent on specific source, clinical condition of patient, organism isolated and number of organisms isolated.

Revised: 7/2014

Wounds (Wounds, tissue, abscesses, aspirates, and drainage specimens)

Microbiological analysis of specimens such as these often provide the only definitive information on the etiology of a given infectious disease process. There are several rules that usually apply to these types of specimens. Tissue or fluid obtained from a site presumed to be involved on the basis of clinical grounds is always superior to swab specimens. Swab specimens should be discouraged when more representative specimens can be obtained. In general, the more specimen the better. There are circumstances, however, when only a swab specimen can be obtained. In such cases, the swabs should be used to extensively sample as representative a portion of the lesion as possible.

Order as: Culture (wound)
Patient Preparation: None
Specimen Collection: Minimum Amount: Swab affected area with culturette or if possible, aspirate material with a sterile syringe, and bring specimen directly to Laboratory.
Stat?: no
Weekend/Holidays: yes
Turnaround Time:
  Preliminary report of positive culture – 24 hours
  Final report - 24-72 hours (depending on organism isolated, may take longer)
Interpretation: Normal: No growth
C. ANAEROBE SPECIMEN COLLECTION AND TRANSPORT

Because anaerobes may be involved in infections at any body site, all specimens collected in a manner to avoid contamination with the normal endogenous flora should be processed for both aerobic and anaerobic bacteria.

Specimens that should not be cultured anaerobically are:

1. Throat or nasopharyngeal swabs
2. Gingival swabs
3. Expectorated sputum
4. Sputum obtained by nasotracheal or orotracheal suction
5. Bronchoscopy specimens not collected by a protected, double-lumen catheter
6. Gastric and small bowel contents (except in "blind loop" and similar syndromes)
7. Bronchoscopy specimens not collected by a protected, double-lumen catheter
8. Gastric and small bowel contents (except in "blind loop" and similar syndromes)
9. Bronchoscopy specimens not collected by a protected, double-lumen catheter
10. Voided and catheterized urines
11. Vaginal and cervical swabs
12. Surface material from decubitus ulcers, wounds, eschar, and sinus tracts
13. Material adjacent to skin or mucous membranes that has not been adequately decontaminated

These types of specimens are determined to be inappropriate because:

a. These specimens predictably yield numerous isolates of unknown clinical significance.
b. The laboratory results may be misleading to the clinician.
c. Such added work is an unnecessary, costly burden on the resources of the patient and laboratory.

Techniques for appropriate ways to collect cultures for anaerobic growth are summarized in the accompanying table:

a. Central Nervous System
   - Cerebrospinal fluid (especially when turbid)
   - Abscess material
   - Tissue biopsy
b. Dental area, ear, nose, throat, and sinuses
   - Carefully aspirated or biopsy material from abscesses after surface decontamination with povidone-iodine.
c. Pulmonary area
   - Transtracheal aspiration
   - Percutaneous lung puncture
   - Thoracotomy specimen
   - Bronchoscopic specimen obtained with protective, double-lumen catheter
d. Abdominal area
   - Paracentesis fluid
   - Needle and syringe aspiration of deep abscess under ultrasound or at surgery.
   - Surgical specimen if not contaminated with intestinal flora
- bile

e. **Female genital tract**
   - Laparoscopy specimens
   - Surgical specimens
   - Endometrial cavity specimen obtained with endometrial suction curette after cervical os is decontaminated

f. **Urinary tract**
   - Suprapubic aspirate of urine

g. **Bone and joint**
   - Aspirate of joint (in suppurative arthritis)
   - Deep aspirate of drainage material after surgery (e.g., in osteomyelitis)

h. **Soft Tissue**
   - Open wounds - deep aspirate of margin or biopsy of the depths of wound only after careful surface decontamination with povidone-iodine
   - Sinus tracts - aspiration by syringe and small plastic catheter after careful decontamination of skin surface
   - Deep abscess, anaerobic cellulitis, infected vascular gangrene, clostridial myonecrosis
   - needle aspirate after surface decontamination
   - Surgical specimens, including curettings and biopsy material
   - Decubiti and other surface ulcers - thoroughly cleanse area with povidone-iodine by surgical scrub technique; aspirate pus from deep pockets or obtain biopsy from deep tissue at margin.

Whenever possible, specimens for anaerobic culture should be collected by aspiration with a needle and syringe or tissue samples should be submitted. Although collection of specimens with swabs are more convenient for medical personnel, such specimens are less desirable. A specimen can be easily contaminated with organisms present on a skin or mucosal surface, anaerobes are exposed to ambient oxygen, the specimen is subjected to drying, a relatively small volume of specimen is collected and swabs are less satisfactory than aspirates for the preparation of smears for direct microscopic examination.

**Transport:**

Successful recovery of anaerobic bacteria requires delivery of the specimen to the clinical laboratory in a transport system that maintains a moist, anaerobic atmosphere. The speed with which the specimen should be delivered to the laboratory depends in part on the quantity of specimen collected. Larger volumes of material can remain relatively anaerobic for a few hours, while tissue will also protect anaerobes from oxygen toxicity. Specially designed anaerobic transport systems should be used for small samples of tissue, aspirated fluids or specimens collected on swabs. Specimens should be maintained at room temperature during transport because refrigeration can decrease the number of viable organisms.

**Summary**

The above are a selection of the most common specimen types. Please call the Microbiology Section at ext. 4859 with any questions regarding specimen collection or source.
Patient preparation: See above narrative.

Specimen collection/minimum amount:
   a. Fluids – 50 ml in heparinized bottle.
   b. Tissue – 1 cm$^3$ or whatever possible.
   c. Culturette swab – not recommended.

Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 5 days (may take longer if positive)
Interpretation: Normal: No growth of anaerobes.

D. SMEAR FOR GENERAL BACTERIAL STAIN

Note: Smears are routinely done on the following specimens (even if not specifically ordered with the culture)
   1. CSF
   2. Body fluids
   3. Eye
   4. Lymph nodes
   5. Sputum
   6. Wounds
   7. Tissue

Patient Preparation: None
Specimen Collection:
   a) Using a sterile swab, make a smear of the affected area.
   b) Let slide air-dry and send directly to the laboratory.
Stat?: Yes
Weekend/Holidays: yes
Turnaround Time: Stat - 60 minutes; Routine - 24 hours
Interpretation: Results interpreted by ordering physician

E. FUNGI CULTURE

Order as: Culture (fungus)
Specimen Collection: Minimum Amount:
   All of the following specimens should be sent immediately to the Laboratory for processing:
   1. CSF - 2-3ml
   2. Body Fluids - Approximately 50 ml in sterile heparinized bottle.
   3. Stool- Not routinely performed - Contact Microbiology Section.
   4. Ear - Not routinely performed - Contact Microbiology Section.
5. Eye - Swab affected area of eye with culturette or send corneal scrapings.
6. Lymph Node - Node should be placed in a dry, sterile container.
7. Mouth or Throat - Swab affected area with a culturette.
8. Sputum - Fresh morning specimen or purulent material - Collect approximately 1-3ml of specimen consisting of material from a deep cough. **Saliva is not a satisfactory specimen.** Collect in a dry, sterile container.
10. Genital - Swab affected area with a culturette
11. Wound - Swab affected area with a culturette or aspirate purulent material into a sterile tube.

**Stat?:** no  
**Weekend/Holidays:** yes  
**Turnaround Time:**  
- **Negative Culture:** Incubated for 4 weeks before being reported negative.  
- **Positive Culture:** Incubated for 1-4 weeks depending on growth rate of organism  
**Interpretation:** Normal: Negative

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**F. FUNGAL SMEAR**

**Order as:** KOH  
**Patient Preparation:** None  
**Specimen Collection: Minimum Amount:**

1. **KOH** - Limited to hair, nails or skin scrapings  
   a. Hair - Representative abnormal hairs removed with forceps and scalp scales collected by scrapings  
   b. Skin - Scrape the active borders of the lesions with a scalpel or glass microscope slide after wiping the affected area with an alcohol swab.  
   c. Nail - Scrape portion of affected area from the nail bed.

**Notes:**  
1. All hair, skin and nail specimens should be placed in a sterile petri dish or a screw-top container.  
2. Muco-cutaneous sites (throat, vagina) requiring fungal smears can be examined for Candida by the gram stain method. These specimens can be obtained by using a culture swab over the affected area. Lymph node and tissue specimens can be examined for fungus by utilizing special histological stains.

2. **India Ink** – Discontinued; Order Cryptococcal Antigen  

**Stat?:** Yes - Cryptococcal Antigen only  
**Weekend/Holidays:** yes  
**Turnaround Time:** KOH - 24 hours  
**Interpretation:** Interpreted by ordering physician
G. T.B. CULTURES (AFB)

**Order as:** Culture (Acid Fast)

**Includes:** Smears are routinely done on all TB cultures. Susceptibility testing will be performed on species specific isolates.

**Patient Preparation:** None

**Specimen Collection/Minimum Amount:**

1. **CSF and other body fluids:**
   a. CSF - 2-3ml
   b. Other body fluids - 50ml
   c. Do not use culture swab

2. **Stool** - Not routinely performed - Contact Microbiology Section

3. **Gastric** - Necessary if patient is unable to provide sputum. Minimum of 3 specimens. Specimen should be obtained before patient gets out of bed in the morning and after fasting at least 8 hours. Specimen must be sent immediately to the laboratory and must be processed within 4 hours.

4. **Sputum** - Early morning specimen - 5-10 ml in a sterile container. **Note:** Three (3) single early morning specimens should be collected on successive days.

5. **Tissue** - (Including lymph nodes) Place specimen in a sterile container and send immediately to the laboratory. Do not use culture swab.

6. **Urine** - Early morning or catheterized urine - 50 ml in a sterile container.

7. **Blood** - Collect specimen in Isolator 10.0 tube via venipuncture. Call Microbiology Lab at ext. 4859 to obtain tube.

**Rejection Criteria:** Insufficient quantity.

**Stat?:** No

**Note:** An AFB smear will be performed stat if there is reasonable presumption of active tuberculosis. This must be approved by the Chief of Microbiology or the Microbiology section head

**Weekend/Holidays:** Yes

**Turnaround Time:** 6 weeks for culture; 24 hours for AFB smear

**Interpretation:** Normal - No growth of AFB.

**Note:** The ordering physician will be notified if specimen shows AFB on smears or growth of AFB organisms.

H. INTESTINAL PARASITES

**Order as:** Ova & Parasites

**Includes:** Specimens submitted in an EcoFix (green-vial) system will have a trichrome stain
Patient Preparation: Specimen Collection: Minimum Amount:

1. Purge - for diagnosis of amoeba
   a. NPO after midnight
   b. Fleets phospho-soda - 1 1/2 oz. followed with a glass of water
   c. Patient may be ambulatory
   d. Collect each stool specimen voided in a wide-mouth container and bring immediately to the Microbiology Section. The technologist will notify the Nursing Unit when the specimen is satisfactory.

2. Casual - for diagnosis of round worms.
   a. Formed stool is collected and transferred to an EcoFix (green vial) system and brought directly to the laboratory.
   b. For diarrhea caused by intestinal parasites, one negative stool O&P analysis is insufficient to rule out parasitic infection. 3-5 stool specimens collected on different days within one week are recommended.
   c. For patients who develop diarrhea after three days of hospitalization, stool culture and O&P analysis are not recommended. Order C. difficile toxin analysis. The Microbiology Section will not perform stool culture and/or stool O&P analysis unless a negative C. difficile toxin analysis is documented.

Rejection criteria: Specimens collected from patients after 3 days of hospitalization will not be processed without the approval of the clinical pathologist or Microbiology supervisor. Improperly collected/preserved specimens are also subject to rejection.

Stat?: No
Weekend/Holidays: Yes
Turnaround Time: 24 hours - same day if ordered in AM
Interpretation: Normal: negative. Please note that this exam will NOT detect Cryptosporidium, Microsporidium, Cyclospora or Isospora.

I. BLOOD SMEARS FOR PARASITES

Order as: Malaria Smear
Patient Preparation: None
Specimen Collection: Minimum Amount: 1 lavender top tube, or thin and thick smears.
   Note: Specimen to be collected during febrile attack if possible. Send specimen to laboratory immediately.
Stat?: Yes
Weekend/Holidays: Yes
Turnaround Time: 1 hour
Interpretation: Normal: negative

J. CRYPTOSPORIDIUM

Order as: Cryptosporidium Microbiology (alpha Browse)
Patient Preparation: See Intestinal Parasites.
K. PINWORM PREP

Order as: Pinworm

Patient Preparation/Specimen Collection/Minimum Amount:

1. The specimen should be collected:
   a. A few hours after the patient has retired for the evening.
   b. First thing in the morning before a bowel movement or bath.

2. Use either a glass slide covered with scotch tape on both sides (sticky side out) or a plastic pinworm paddle.

3. Press sticky surfaces against several areas in the perineal region.

4. The glass slide should then be placed in a petri dish; the pinworm paddle should be placed in a tube or petri dish. Specimen must be brought directly to the Microbiology Section. Avoid creating aerosols!

Stat?: No
Weekend/Holidays: Yes
Turnaround Time: 20-30 minutes
Interpretation: Normal - negative

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L. TRICHOMONAS VAGINALIS PREP

Order as: Trichomonas (vaginal)

Patient Preparation: Specimen Collection: Minimum Amount:

1. Swab affected area and place swab in a tube of sterile saline (1-2 ml)
2. Specimen should be brought directly to the Laboratory for processing.

Stat?: Yes
Weekend/Holidays: Yes
Turnaround Time: 1 hour
Interpretation: Normal – Negative

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M. TRICHOMONAS CULTURE

Order as: Trichomonas culture
Synonym: Trichomonas vaginalis culture
Patient Preparation/Specimen Collection/Minimum Amount:
1. Swab affected area and place swab in Trichase media obtained from Microbiology Lab.
2. Bring specimen directly to Microbiology Lab for processing.
Stat: Yes
Weekends/Holidays: Yes
Turnaround Time: Wet prep read at time of initial collection. Preliminary reports at 24 hrs and 48 hrs. Final at 5 days.
Interpretation: Normal: No Trichomonas seen.

VII. MOLECULAR PATHOLOGY TESTING

A. Monitoring Bone Marrow Transplantation
Order as: Chimerism Testing. Please contact Cancer Center bone marrow transplant section for appropriate forms. Pre-transplant specimen must be submitted for analysis before transplant. Post transplant analysis can be performed 30 days, 60, days and 90 days post-transplant. Analysis post 90 days can also be performed.
Patient Preparation/Specimen Collection/Minimum Amount:
1. Peripheral blood, bone marrow, unsorted analysis, 1 ml in lavender top tube.
2. For sorted cell analysis (CD3, CD15, 3 ml)
3. Buccal specimen, use a swab to collect specimen. Do not brush hard when collecting specimen. Minimum 4 swabs should be collected.
Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.
Stat?: No
Weekend/Holidays: Yes
Turnaround Time: 3-7 days
Interpretation: Percentage of donor/recipient cells present in peripheral blood, bone marrow, or sorted cells.

B. Molecular Coagulation Panel
Order as: Molecular Gen-coag
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood, in lavender top tube, 3 ml.
Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.
Stat?: No
Weekend/Holidays: No
Turnaround Time: 3-4 days
Interpretation: Mild type, heterozygous mutant, or homozygous mutant.

C. B & T cell Gene rearrangement
Order as: Gene rearrangement, please indicate T and/or B cell.
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood/bone marrow, in lavender top tube, 3 ml.
Tissue, or paraffin block, 5 x 10 micron tissue sections, unbaked. Please contact Dr. Hong at ext. 4854, or the Molecular Lab at ext. 4859.
Specimen must be brought directly to the Molecular Diagnostics Section of the
Pathology Lab.
Stat?: No
Weekend/Holidays: No
Turnaround Time: 3-4 days
Interpretation: Polyclonal or monoclonal B and/or T cell population.

D. BCR-ABL PCR
Order as: BCR-ABL PCR
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood/bone marrow, in lavender top tube, 3 ml.
Specimen must be brought directly to the Molecular Diagnostics Section of the
Pathology Lab.
Stat?: No
Weekend/Holidays: No
Turnaround Time: 2 days
Interpretation: Positive or negative for PCR-ABL translocation(with specific type of
translocation indicated).

E. BCR ABL FISH
Order as: BCR-ABL or t(9:22) FISH
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood/bone marrow, in lavender top tube, 3 ml.
Tissue, or paraffin block, 4 micron tissue sections, unbaked. Please contact Dr.
Tao Hong at ext. 4854, or the Molecular Lab at ext. 4859.
Specimen must be brought directly to the Molecular Diagnostics Section of the
Pathology Lab.
Stat?: No
Weekend/Holidays: No
Turnaround Time: 1-2 days
Interpretation: Positive or negative for PCR-ABL translocation.

F. PML-RARA FISH
Order as: PML-RARA or t(15:17)
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood/bone marrow, in lavender top tube, 3 ml.
Specimen must be brought directly to the Molecular Diagnostics Section of the
Pathology Lab.
Stat?: Yes (please contact Dr. Hong at ext. 4854 or the Molecular Lab at ext. 4859, if
Stat is requested)
Weekend/Holidays: No
Turnaround Time: 1-2 days
Interpretation: Positive or negative for PML-RARA translocation.

G. PML-RAR PCR
Order as: PML-RARA (t15:17) PCR
Patient Preparation/Specimen Collection/Minimum Amount:
Peripheral blood/bone marrow, in lavender top tube, 3 ml.
Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.

Stat?: No  
Weekend/Holidays: No  
Turnaround Time: 2 days  
Interpretation: Positive or negative for PML-RARA translocation.

**H. C-MYC FISH**

Order as: c-MYC FISH

Patient Preparation/Specimen Collection/Minimum Amount:
- Peripheral blood/bone marrow, in lavender top tube, 3 ml.
- Tissue, or paraffin block, 4 micron tissue sections, unbaked. Please contact Dr. Hong at 4854 or the molecular Lab at 4859.

Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.

Stat?: No  
Weekend/Holidays: No  
Turnaround Time: 1-2 days  
Interpretation: Positive or negative for translocation of 8q24..

**I. 11-14 Translocation, FISH**

Order as: t(11-14) FISH

Patient Preparation/Specimen Collection/Minimum Amount:
- Peripheral blood/bone marrow, in lavender top tube, 3 ml.
- Tissue, or paraffin block, 4 micron tissue sections, unbaked. Please contact Dr. Hong at x4854 or the molecular Lab at 4859.

Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.

Stat?: No  
Weekend/Holidays: No  
Turnaround Time: 1-2 days  
Interpretation: Positive or negative for IGH/CCND1 t(11:14) translocation.

**J. t(14-18), FISH**

Order as: 14-18 translocation FISH

Patient Preparation/Specimen Collection/Minimum Amount:
- Peripheral blood/bone marrow, in lavender top tube, 3 ml.
- Tissue, or paraffin block, 4 micron tissue sections, unbaked. Please contact Dr. Hong at x4854 or the molecular Lab at 4859.

Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.

Stat?: No  
Weekend/Holidays: No  
Turnaround Time: 1-2 days  
Interpretation: Positive or negative for t(14:18) translocation

**K. NASOPHARYNGEAL BORDETELLA PERTUSSIS PCR**
Order as: Bordetella pertussis PCR
Patient Preparation/Specimen Collection/Minimum Amount:
   The acceptable specimen is: one extra fine nasopharyngeal swab.
   Swab material should be Dacron or synthetic-polyester NP swab, *calcium alginate swab is not acceptable (inhibitory to PCR).*
   To take the specimen, immobilize the patient’s head and gently pass the swab through the nostril into the nasopharynx. Immerse the swab completely into the tube containing the semisolid transport media. Leave the swab immersed in the media for transport
   Specimen must be brought directly to the Microbiology Section of the Pathology Lab.
Stat?: Yes. Please contact Microbiology at ext. 4859
Weekend/Holidays: Yes
Turnaround Time: 12 Hours
Interpretation: Positive or Negative for *B. pertussis*

L. Mycobacterium Tuberculosis (MTB) PCR
Order as: TB PCR
Patient Preparation: None
Specimen Collection/Minimum Amount:
1. Bronchial lavage: 5-10 ml.
2. Sputum - Early morning specimen - 5-10 ml in a sterile container. Note: Three (3) single early morning specimens should be collected on successive days.
3. Tissue - (Including lymph nodes) Place specimen in a sterile container and send immediately to the laboratory. Do not use culture swab.
Rejection Criteria: Insufficient quantity.
Stat?: Yes, please contact Dr. Hong at ext. 4854 or Molecular lab at ext. 4859 if stat is requested
Weekend/Holidays: No
Turnaround Time: 1 day
Interpretation: Positive or negative for *M. tuberculosis*

M. 16S rDNA sequencing for Bacterial detection/identification
   Please contact Dr. Hong at 4854 or the molecular lab at ext. 4859 if this procedure is requested.

N. Her2/Neu gene amplification FISH
Order as: Her2/neu FISH
Patient Preparation/Specimen Collection/Minimum Amount:
   Breast cancer tissue, 4 micron section, unbaked.
   An H&E stained section should also be submitted
   Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.
Stat?: No
Weekend/Holidays: No
Turnaround Time: 7 days
Interpretation: Positive or negative for Her1/neu gene amplification.

**O. K-RAS gene mutation**

Order as: K-RAS gene mutation

Patient Preparation/Specimen Collection/Minimum Amount:
- Lung/colon cancer tissue, 10 micron section, unbaked.
- An H&E stained section should also be submitted
- Specimen must be brought directly to the Molecular Diagnostics Section of the Pathology Lab.

Stat?: No
Weekend/Holidays: No
Turnaround Time: 7 days

Interpretation: Positive or negative for mutations in codon 12 and 13.

### VIII. SURGICAL PATHOLOGY SPECIMENS

**In-Patients:** Order specimens for surgical pathology examination by completing a Tissue Examination Card (available from Distribution, HUMC inventory # 5020126). A completed computer-generated form or card must accompany every specimen or the specimen will not be accepted in the Laboratory.

**Out-patients:** Complete a TotaLab requisition form (available from the Pathology Outreach Office, 201-996-4881) to accompany the specimen.

- **ALL SPECIMEN CONTAINERS MUST BE TIGHTLY SEALED TO PREVENT LEAKAGE AND CLEARLY LABELED WITH PATIENT IDENTIFICATION.**
- **THE ACCOMPANYING FORM/CARD MUST INCLUDE:**
  1. **PATIENT IDENTIFICATION,**
  2. **SPECIMEN SOURCE,**
  3. **RELEVANT DIAGNOSIS & DATA,**
  4. **TYPE OF PROCEDURE PERFORMED,**
  5. **REASON FOR THE TEST.**
- **THE FORM/CARD MUST BE FREE FROM BLOOD/BODY FLUID CONTAMINATION.**

**NOTE:** The pathologist may order additional testing as necessary for specimen diagnosis.

### 1. ROUTINE HISTOPATHOLOGY SPECIMENS:

Any surgical specimen which is considered “routine” should be placed in an appropriate-sized container with 10% neutral buffered formalin. Various sized containers are available from Histology. Routine specimens will be picked up on the service by the Histology courier on their scheduled rounds.

STAT specimens should be delivered by the service directly to the Histology Section:

Mon – Fri: all shifts; Saturday: 6 AM – 3:30 PM; Sunday: 6 AM – 1 PM.

Specimens should always be handed directly to a tech; never leave a specimen
unattended. If the Histology room is unattended, deliver the specimen to the Stat Lab accessioning area.

2. HISTOPATHOLOGY SPECIMENS REQUIRING SPECIAL HANDLING:

Non-routine procedures and/or specimens requiring special handling should be scheduled with the O.R. between 8 AM and 12 noon.

<table>
<thead>
<tr>
<th>Type of Specimen</th>
<th>Handling Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymph nodes with potential hematologic disorder or malignancy (exclude known metastatic carcinomas)</td>
<td>Place portion of specimen in RPMI for Flow Cytometry. The remainder in formalin.</td>
</tr>
</tbody>
</table>
| Kidney biopsy (Schedule Mon – Fri) Muscle or Nerve biopsy (Schedule Mon-Tues- Wed only) | • Notify Pathology (x 4840 or 4870) after procedure has been scheduled with the O.R.  
 • Place specimen fresh in saline-moistened gauze and send immediately to Histology. |
| Tissue for Immunofluorescence: i.e. Skin, Lung, other tissue | • Notify Pathology (x 4840 or 4870) after procedure has been scheduled with the O.R.  
 • Place specimen fresh in saline-moistened gauze and send immediately to Histology. |
| Tissue for Cytogenetics Studies | Submit specimen fresh. Indicate on surgical card that the specimen needs “cytogenetics studies” |
| Tissue for Microbiology Culture | • Remove a representative portion under sterile technique and place in a sterile container.  
 • Order the specimen in the hospital computer system (under “Microbiology”).  
 • Send the labeled sterile container to Microbiology with a computer-generated “Clinician Obtained Specimen” form.  
 • If one piece of specimen is for BOTH Microbiology and Surgical Pathology processing, place it in a sterile container and send to Microbiology first. You must include paperwork requesting both microbiological and histopathological testing. |
| Tissue Procurement/Research | • Schedule cases in advance with Pathology ext. 4870 or 4808.  
 • Applicable protocol with IRB approval must be sent to Pathology prior to specimen receipt.  
 • Submit specimen FRESH, immediately upon removal to the Link OR Frozen Section Room, 4158. |
| Hormone Receptor Studies  
(i.e. Estrogen or Progesterone Receptors on Breast or other tissue) | • Place tissue in adequate amount of 10% formalin ASAP or send for frozen section if necessary.  
 • All surgical specimens that are diagnosed |
by a pathologist as invasive breast cancer will have a Breast Cancer Profile (includes Hormone receptors, Ki67, p53, Her-2/neu) performed.

- For Breast Cancer Profile requests on a previously submitted specimen or on an outside case, complete an “Additional Test Form” (available from Pathology at X 4808)

<table>
<thead>
<tr>
<th>Foreign bodies (i.e. swallowed or imbedded objects)</th>
<th>Submit specimen fresh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast implants</td>
<td>Submit specimen fresh.</td>
</tr>
<tr>
<td>Orthopedic hardware</td>
<td>Submit specimen fresh.</td>
</tr>
<tr>
<td>Bone Marrow</td>
<td>Aspirate: Submit in RPMI Biopsy: Submit in B Plus</td>
</tr>
<tr>
<td>Kidney stones/ Gall stones for chemical analysis</td>
<td>Submit specimen fresh.</td>
</tr>
<tr>
<td>Other specimens</td>
<td>A specimen normally considered “routine” may have extenuating circumstances that require special handling. If in doubt, please consult a Pathologist prior to specimen collection or fixation (call ext. 4808). After 7 PM, have the operator page the anatomic pathologist on call).</td>
</tr>
</tbody>
</table>

3. SPECIMENS EXEMPTED FROM MANDATORY SUBMISSION TO PATHOLOGY

IT IS NOT REQUIRED TO SEND THESE SPECIMENS TO THE LABORATORY. However, at the physician’s request, they may be submitted to Pathology for examination. All specimens not specifically exempted must be submitted to the Pathology Department for examination. While non-submitted specimens are routinely disposed of by the surgical staff into Regulated Medical Waste containers on the unit, the specimen(s) may be released by the surgical staff for approved research protocols. In such cases, a written consent MUST be in the patient chart. NOTE: Any specimen not sent to Pathology must have the method of final disposal in the patient’s medical record.

Tissue Specimens

- Bone donated to the bone bank.
- Cataracts removed by phacoemulsification.
- Fat removed by liposuction.
- Foreskin from circumcisions of newborns.
- Middle ear ossicles.
- Placentas from uncomplicated pregnancies that appear normal at time of delivery (do not meet institutionally specified criteria for examination).
- Vein segments harvested for coronary artery bypass.
- Skin or other normal tissue removed during a cosmetic or reconstructive procedure (e.g., Abdominoplasty, blepharoplasty, brachioplasty, cleft palate repair, rhytidectomy, syndactyly repair, thigh/face lift skin), provided it is not contiguous with a lesion and the patient
does not have a history of malignancy. **Exception:** breast tissue / breast skin should be sent to Pathology.

- Teeth when there is no attached soft tissue.
- Normal toenails and fingernails that are incidentally removed.
- Cosmetic scars **unless related to a malignancy.**
- Knee shavings (added 01/08/13 per approval of the OR Committee)

**NON - Tissue Specimens**

- Dental appliances.
- Foreign bodies such as bullets or other medicolegal evidence given directly to law enforcement personnel.
- Medical devices such as catheters, gastrostomy tubes, myringotomy tubes, stents, and sutures that have not contributed to patient illness, injury or death.
- Orthopedic hardware and other radio-opaque mechanical devices provided there is an alternative policy for documentation of their surgical removal.
- Therapeutic radioactive sources (to be disposed of by the HUMC Radiation Safety Office)

**4. SPECIMENS THAT CAN BE ORDERED AS “GROSS EXAMINATION ONLY”**

IT **IS REQUIRED** TO SEND THESE SPECIMENS TO THE LABORATORY. **NOTE:** A microscopic examination will be performed on these specimens whenever there is a request by the attending physician, or when the pathologist determines a microscopic examination is indicated by the gross findings or clinical history.

**Tissue Specimens**

- Accessory digits.
- Bunions and hammertoes.
- Extraocular muscle from corrective surgical procedures (e.g., strabismus repair).
- Nasal bone and cartilage from rhinoplasty or septoplasty.
- Umbilical hernia sacs in children.
- Varicose veins.

**NON - Tissue Specimens**

- Calculi
- Foreign bodies (unless given directly to law enforcement)
- Synthetic graft material
- Prosthetic cardiac valves without attached tissue.
- Breast implants
- Penile prostheses

**IX. PATIENT REQUESTS FOR LABORATORY SPECIMENS:**

Laboratory specimens that cannot be rendered non-infectious by heat or chemical sterilization or which have been saturated with hazardous chemicals (such as formalin) will not be released directly to the patient. These include, but are not limited to, body tissue and organs, gallstones, calculi, placentas, breast implants with attached tissue, blood and body fluids etc. These items are considered regulated medical waste by the New Jersey EPA and, as such, pose a potential hazard
to the patient. The Medical Center is legally responsible for the appropriate handling and disposition of such items.

Specimens that can be rendered non-infectious by heat or chemical sterilization (such as orthopedic hardware, certain foreign bodies, etc.) can be safely released to the patient.

With the written authorization of a patient or guardian, certain specimens may be released to a funeral director, manufacturer, outside laboratory, private physician or other parties deemed acceptable by the Department in consult with the HUMC Legal Office. Such requests must be received in Pathology within the timeframe of specimen retention established by the Department.

References:  HUMC Infection Control Policy 703-12: Waste Management
            HUMC Administrative Policy 1511: Patient Requests for Specimens

X. REFLEXIVE TESTING

There are certain tests which, if abnormal, will result in the ordering and performing of additional tests and/or interpretations to clarify the diagnosis. These are called REFLEXIVE TESTS. These additional tests will generate additional charges.

These tests include:
1. Surgical Pathology and Cytopathology specimens (Immunohistochemistry, Flow Cytometry, FISH, Molecular studies, Cytogenetic studies, In-Situ hybridization)
2. Positive Microbiology Testing
3. Positive Antibody Tests
4. Positive Hepatitis B Surface Antigen and Hepatitis C
5. Hemoglobin Electrophoresis
6. Positive STS
7. Positive Cryptococcal Antigen
8. Routine Urinalysis
9. CBC, Abnormal
10. Positive Antinuclear Antibody Tests
11. Positive HIV Test
12. Blood Bank Antibody Screen
13. DAT (Direct Coombs)
14. Direct LDL on Lipid Panel Triglyceride values greater than 400 mg/dl
15. PAP smears with ASCUS diagnosis

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<th>Criteria for Reflex</th>
<th>Test Ordered by Reflex</th>
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**CHEMISTRY**

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**HEMATOLOGY**

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<td>Cryptococcal Antigen</td>
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<td>Slide culture</td>
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<td>Misc. testing as per organism</td>
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</tr>
</tbody>
</table>

**XI. PEDIATRIC REFERENCE RANGES: CHEMISTRY AND HEMATOLOGY**

Age specific reference ranges are reported with laboratory test results whenever applicable.
## ALPHA INDEX

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<tr>
<td>ALT</td>
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<td>AMYLASE</td>
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<td>BILIRUBIN, DIRECT</td>
<td>70</td>
</tr>
<tr>
<td>BILIRUBIN, TOTAL</td>
<td>69</td>
</tr>
<tr>
<td>BUN</td>
<td>67</td>
</tr>
<tr>
<td>CALCIUM</td>
<td>68</td>
</tr>
<tr>
<td>CHLORIDE</td>
<td>67</td>
</tr>
<tr>
<td>CO2</td>
<td>68</td>
</tr>
<tr>
<td>CREATININE</td>
<td>67</td>
</tr>
<tr>
<td>ERYTHROCYTE COUNT (RBC)</td>
<td>71</td>
</tr>
<tr>
<td>GGTP</td>
<td>69</td>
</tr>
<tr>
<td>GLUCOSE</td>
<td>67</td>
</tr>
<tr>
<td>HEMATOCRIT</td>
<td>71</td>
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<tr>
<td>HEMOGLOBIN</td>
<td>71</td>
</tr>
<tr>
<td>LD</td>
<td>69</td>
</tr>
<tr>
<td>LEUKOCYTE COUNT (WBC)</td>
<td>71</td>
</tr>
<tr>
<td>MAGNESIUM</td>
<td>70</td>
</tr>
<tr>
<td>MCH (MEAN CELL HEMOGLOBIN)</td>
<td>72</td>
</tr>
<tr>
<td>MCHC (MEAN CELL HEMOGLOBIN CONCENTRATION)</td>
<td>72</td>
</tr>
<tr>
<td>MCV (MEAN CELL VOLUME)</td>
<td>72</td>
</tr>
<tr>
<td>PHOSPHORUS</td>
<td>70</td>
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<tr>
<td>PLATELET COUNT</td>
<td>73</td>
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<tr>
<td>POTASSIUM</td>
<td>67</td>
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<tr>
<td>RBC (ERYTHROCYTE COUNT)</td>
<td>71</td>
</tr>
<tr>
<td>RDW (RED CELL DISTRIBUTION WIDTH)</td>
<td>73</td>
</tr>
<tr>
<td>RETICULOCYTE COUNT</td>
<td>73</td>
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<tr>
<td>SODIUM</td>
<td>67</td>
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<tr>
<td>TOTAL PROTEIN</td>
<td>68</td>
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<tr>
<td>URIC ACID</td>
<td>70</td>
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<tr>
<td>WBC (LEUKOCYTE COUNT)</td>
<td>73</td>
</tr>
<tr>
<td>WBC DIFFERENTIAL (Absolute)</td>
<td>74</td>
</tr>
<tr>
<td>WBC DIFFERENTIAL (Relative, %)</td>
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</tr>
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**HUMC DEPARTMENT OF PATHOLOGY**  
**PEDIATRIC REFERENCE RANGES FOR CHEMISTRY**

**REFERENCE-PEDIATRIC REFERENCE RANGES BY SOLDIN ET AL. 1997**  
**INSTRUMENT: Ortho Diagnostics VITROS**  
**POPULATION-HEALTHY CHILDREN UNLESS OTHERWISE INDICATED.**
### Glucose

<table>
<thead>
<tr>
<th>Age</th>
<th>Male and Female (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 Month</td>
<td>55-115</td>
</tr>
<tr>
<td>1-6 Month</td>
<td>57-117</td>
</tr>
<tr>
<td>6 Mo-18 Yrs</td>
<td>70-126</td>
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</tbody>
</table>

### BUN

<table>
<thead>
<tr>
<th>Age</th>
<th>Male and Female (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 Yrs</td>
<td>5-17</td>
</tr>
<tr>
<td>4-13 Yrs</td>
<td>7-17</td>
</tr>
<tr>
<td>14-18 Yrs</td>
<td>8-21</td>
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</tbody>
</table>

### Creatinine

<table>
<thead>
<tr>
<th>Age</th>
<th>Hospitalized Patients (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 wk</td>
<td>0.6-1.1</td>
</tr>
<tr>
<td>1 wk-1 mo</td>
<td>0.3-0.7</td>
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<tr>
<td>1 mo-1 yr</td>
<td>0.2-0.4</td>
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<tr>
<td>1-18 yrs</td>
<td>0.2-0.7</td>
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### Sodium

<table>
<thead>
<tr>
<th>Age</th>
<th>Hospitalized Patients (mmol/l)</th>
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<tbody>
<tr>
<td>0-7 days</td>
<td>133-146</td>
</tr>
<tr>
<td>7-31 days</td>
<td>134-144</td>
</tr>
<tr>
<td>1-6 months</td>
<td>134-142</td>
</tr>
<tr>
<td>6 mo-1 yr</td>
<td>133-142</td>
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<td>1 yr-18 yrs</td>
<td>134-143</td>
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### Potassium

<table>
<thead>
<tr>
<th>Age</th>
<th>Hospitalized Patients (mmol/l)</th>
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</thead>
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<td>4.0-6.0</td>
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<tr>
<td>1 wk-1 mo</td>
<td>4.0-6.0</td>
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<tr>
<td>1-6 mo</td>
<td>3.5-5.6</td>
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<tr>
<td>6 mo-1 yr</td>
<td>3.5-6.1</td>
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<td>1 yr-18 yrs</td>
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### Chloride

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<thead>
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<tr>
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<tr>
<td>1 wk-1 month</td>
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<tr>
<td>1-6 mo</td>
<td>96-110</td>
</tr>
<tr>
<td>6 mo-1 yr</td>
<td>96-108</td>
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<td>1 yr-18 yrs</td>
<td>96-109</td>
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### CO2

<table>
<thead>
<tr>
<th>Age</th>
<th>Hospitalized Patients (mmol/l)</th>
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<td>0-1 wk</td>
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<tr>
<td>Age</td>
<td>Calcium (mg/dl)</td>
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<tr>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>0-1 WK</td>
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<tr>
<td>1 WK-3 YR</td>
<td>8.7-9.8</td>
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<tr>
<td>4-6 YR</td>
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<tr>
<td>7-9 YR</td>
<td>8.8-10.1</td>
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<tr>
<td>10-11 YR</td>
<td>8.9-10.1</td>
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<tr>
<td>12-13 YR</td>
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</tr>
<tr>
<td>14-15 YR</td>
<td></td>
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<tr>
<td>16-18 YR</td>
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HUMC Department of Pathology
Pediatric Reference Ranges for Chemistry
<table>
<thead>
<tr>
<th>Age</th>
<th>ALKALINE PHOSPHATASE</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>0-3YRS</td>
<td>145-320</td>
<td>145-320</td>
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<tr>
<td>4-6</td>
<td>150-380</td>
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<tr>
<td>7-9</td>
<td>175-420</td>
<td>175-420</td>
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<tr>
<td>10-11</td>
<td>135-530</td>
<td>130-560</td>
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<td>12-13</td>
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<tr>
<td>14-15</td>
<td>130-525</td>
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<td>16-18</td>
<td>65-260</td>
<td>50-130</td>
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<table>
<thead>
<tr>
<th>Age</th>
<th>LACTATE DEHYDROGENASE (LD)</th>
<th>Male</th>
<th>Female</th>
</tr>
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<tbody>
<tr>
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<td>4-6</td>
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<td>10-11</td>
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<td>380-700</td>
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<td>12-13</td>
<td>470-750</td>
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<td>16-18</td>
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<table>
<thead>
<tr>
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<th>Female</th>
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<tbody>
<tr>
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<td>6-19</td>
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<tr>
<td>4-6</td>
<td>10-22</td>
<td>10-22</td>
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</tr>
<tr>
<td>7-9</td>
<td>13-25</td>
<td>13-25</td>
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<tr>
<td>10-11</td>
<td>17-30</td>
<td>17-28</td>
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<td>17-44</td>
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<td>14-15</td>
<td>12-33</td>
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<td>16-18</td>
<td>11-34</td>
<td>11-28</td>
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<table>
<thead>
<tr>
<th>Age</th>
<th>BILIRUBIN, TOTAL</th>
<th>Male and Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 DAY</td>
<td>0 - 5.8</td>
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</tr>
<tr>
<td>1-2 DAYS</td>
<td>0 - 8.2</td>
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</tr>
<tr>
<td>3-5 DAYS</td>
<td>0 - 11.7</td>
<td></td>
</tr>
<tr>
<td>5 DAYS-18YRS</td>
<td>0 - 1.0</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>BILIRUBIN, DIRECT (Conjugated)</th>
<th>Male and Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6DAYS</td>
<td>0-0.6</td>
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### Amylase

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE AND FEMALE</th>
<th>U/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-18YRS</td>
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### Magnesium

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE AND FEMALE</th>
<th>MG/DL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWBORN</td>
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<td>1.2-2.6</td>
</tr>
<tr>
<td>NEWBORN</td>
<td>7-30DAYS</td>
<td>1.6-2.4</td>
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<tr>
<td>1MO-1YEAR</td>
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<td>1.6-2.6</td>
</tr>
<tr>
<td>1-2 YEARS</td>
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<td>1.6-2.6</td>
</tr>
<tr>
<td>2-6 YEARS</td>
<td></td>
<td>1.5-2.4</td>
</tr>
<tr>
<td>6-10YEARS</td>
<td></td>
<td>1.6-2.3</td>
</tr>
<tr>
<td>10-14YEARS</td>
<td></td>
<td>1.6-2.2</td>
</tr>
<tr>
<td>14-18YEARS</td>
<td></td>
<td>1.5-2.3</td>
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### Phosphorus

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE AND FEMALE</th>
<th>MG/DL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5DAYS</td>
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<td>2.9-5.4</td>
</tr>
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<td>16-18</td>
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### Uric Acid

<table>
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<th>FEMALE</th>
</tr>
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<tbody>
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<td>1.8-5.0</td>
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<td>2.2-4.7</td>
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<td>7-9</td>
<td>2.0-5.0</td>
<td>2.0-5.0</td>
</tr>
<tr>
<td>10-11</td>
<td>2.3-5.4</td>
<td>3.0-4.7</td>
</tr>
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<td>12-13</td>
<td>2.7-6.7</td>
<td>3.0-5.8</td>
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<td>14-15</td>
<td>2.4-7.8</td>
<td>3.0-5.8</td>
</tr>
<tr>
<td>16-18</td>
<td>4.0-8.6</td>
<td>3.0-5.9</td>
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### HEMOGLOBIN

<table>
<thead>
<tr>
<th>AGE</th>
<th>G/DL</th>
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</thead>
<tbody>
<tr>
<td>0-1 MO</td>
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<tr>
<td>1-2 MO</td>
<td>10.7-17.1</td>
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<tr>
<td>2-4 MO</td>
<td>9.4-13.0</td>
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<tr>
<td>4-6 MO</td>
<td>10.3-14.1</td>
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<tr>
<td>6-9 MO</td>
<td>11.1-14.1</td>
</tr>
<tr>
<td>9-12MO</td>
<td>11.4-14.0</td>
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<tr>
<td>1-3 YRS</td>
<td>11.0-14.0</td>
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<tr>
<td>3-6 YRS</td>
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<tr>
<td>15-17YRS Male</td>
<td>11.7-16.6</td>
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<tr>
<td>15-17YRS Female</td>
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### RBC - ERYTHROCYTE COUNT

<table>
<thead>
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<th>AGE</th>
<th>X10^6 CELLS/MICROL</th>
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<tbody>
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<td>0-1MO</td>
<td>3.9-5.9</td>
</tr>
<tr>
<td>1-2MO</td>
<td>3.3-5.3</td>
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<td>2-4MO</td>
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<tr>
<td>4-6MO</td>
<td>3.5-5.1</td>
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<tr>
<td>6-9MO</td>
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<td>9-12MO</td>
<td>4.0-5.3</td>
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<tr>
<td>1-3 YRS</td>
<td>3.8-4.8</td>
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<tr>
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<td>3.7-4.9</td>
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<td>3.8-4.9</td>
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<td>3.9-5.1</td>
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<tr>
<td>12-15YRS Male</td>
<td>4.1-5.2</td>
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<tr>
<td>15-17 YRS Male</td>
<td>4.2-5.6</td>
</tr>
<tr>
<td>15-17 YRS Female</td>
<td>3.8-5.0</td>
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</tbody>
</table>

### HUMC DEPARTMENT OF PATHOLOGY

**PEDIATRIC REFERENCE RANGES FOR HEMATOLOGY**

### MCV - MEAN CELL VOLUME

<table>
<thead>
<tr>
<th>AGE</th>
<th>FL</th>
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<tbody>
<tr>
<td>0-1 MO</td>
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<tr>
<td>1-2 MO</td>
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<td>76-97</td>
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<td>6-9 MO</td>
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### MCH - MEAN CELL HEMOGLOBIN

<table>
<thead>
<tr>
<th>AGE</th>
<th>PG/CELL</th>
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<tbody>
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<td>1-2 MO</td>
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<td>26-32</td>
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### MCHC - MEAN CELL HEMOGLOBIN CONCENTRATION

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<tr>
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<td>28-35</td>
</tr>
<tr>
<td>4-6 MO</td>
<td>29-37</td>
</tr>
<tr>
<td>6-9 MO</td>
<td>32-37</td>
</tr>
<tr>
<td>9-12MO</td>
<td>32-37</td>
</tr>
<tr>
<td>1-3 YR</td>
<td>32-38</td>
</tr>
<tr>
<td>3-6 YR</td>
<td>32-37</td>
</tr>
<tr>
<td>6-9 YR</td>
<td>32-37</td>
</tr>
<tr>
<td>9-12YR</td>
<td>32-37</td>
</tr>
<tr>
<td>12-15YR</td>
<td>32-37</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>32-36</td>
</tr>
<tr>
<td>15-17 YR</td>
<td>32-36</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>32-36</td>
</tr>
</tbody>
</table>

### HUMC DEPARTMENT OF PATHOLOGY

PEDiatric reference ranges for Hematology

### RDW - RED CELL DISTRIBUTION WIDTH

<table>
<thead>
<tr>
<th>AGE</th>
<th>PER CENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 MO</td>
<td>14.9-18.7</td>
</tr>
<tr>
<td>&gt;6 MO</td>
<td>11.5-14.5</td>
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</table>

### PLATELET COUNT

<table>
<thead>
<tr>
<th>AGE</th>
<th>X10³/MICROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADULT AND PEDIATRIC</td>
<td>135-430</td>
</tr>
</tbody>
</table>
### WBC - LEUKOCYTE COUNT

<table>
<thead>
<tr>
<th>AGE</th>
<th>X10^3CELLS/MICROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 DAYS</td>
<td>9-30.0</td>
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<tr>
<td>7-30DAYS</td>
<td>5-20.0</td>
</tr>
<tr>
<td>1-2 MO</td>
<td>6-17.5</td>
</tr>
<tr>
<td>2-4 MO</td>
<td>6-17.5</td>
</tr>
<tr>
<td>4-6 MO</td>
<td>6-17.5</td>
</tr>
<tr>
<td>6-9 MO</td>
<td>6-17.5</td>
</tr>
<tr>
<td>9-12MO</td>
<td>6-17.5</td>
</tr>
<tr>
<td>1-3 YR</td>
<td>6-17.5</td>
</tr>
<tr>
<td>3-6 YR</td>
<td>5.5-15.5</td>
</tr>
<tr>
<td>6-9 YR</td>
<td>4.5-13.5</td>
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<tr>
<td>9-12YR</td>
<td>4.5-13.5</td>
</tr>
<tr>
<td>12-15YR</td>
<td>4.5-13.0</td>
</tr>
<tr>
<td>15-17YR</td>
<td>4.5-13.0</td>
</tr>
</tbody>
</table>

### RETICULOCYTE COUNT

<table>
<thead>
<tr>
<th>AGE</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 MO</td>
<td>0.2-2.0</td>
</tr>
<tr>
<td>1-2 MO</td>
<td>0.4-4.8</td>
</tr>
<tr>
<td>2-4 MO</td>
<td>0.3-3.6</td>
</tr>
<tr>
<td>4-6 MO</td>
<td>0.2-2.8</td>
</tr>
<tr>
<td>6-9 MO</td>
<td>0.2-2.8</td>
</tr>
<tr>
<td>9-12MO</td>
<td>0.2-2.8</td>
</tr>
<tr>
<td>1-3 YR</td>
<td>0.4-1.8</td>
</tr>
<tr>
<td>3-6 YR</td>
<td>0.4-1.8</td>
</tr>
<tr>
<td>6-9 YR</td>
<td>0.4-1.8</td>
</tr>
<tr>
<td>9-12YR</td>
<td>0.4-1.8</td>
</tr>
<tr>
<td>12-15YR</td>
<td>0.5-1.5</td>
</tr>
<tr>
<td>15-17YR</td>
<td>0.5-1.5</td>
</tr>
</tbody>
</table>

### HUMC DEPARTMENT OF PATHOLOGY

**PEDIATRIC REFERENCE RANGES FOR HEMATOLOGY**

### WHITE CELL DIFFERENTIAL - X10^3CELLS/MICROL

<table>
<thead>
<tr>
<th>AGE</th>
<th>NEUT (TOTAL)</th>
<th>EOS</th>
<th>BASO</th>
<th>LYMPHS</th>
<th>MONOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1MO</td>
<td>1.8-5.4</td>
<td>0-0.9</td>
<td>0-0.2</td>
<td>2.8-9.0</td>
<td>0-1.7</td>
</tr>
<tr>
<td>1-2MO</td>
<td>1.8-5.4</td>
<td>0-0.9</td>
<td>0-0.2</td>
<td>2.8-9.0</td>
<td>0-1.7</td>
</tr>
<tr>
<td>2-4MO</td>
<td>1.8-5.4</td>
<td>0-0.9</td>
<td>0-0.2</td>
<td>2.8-9.0</td>
<td>0-1.7</td>
</tr>
<tr>
<td>4-6MO</td>
<td>1.8-5.4</td>
<td>0-0.9</td>
<td>0-0.2</td>
<td>2.8-9.0</td>
<td>0-1.7</td>
</tr>
<tr>
<td>6-9MO</td>
<td>1.0-8.5</td>
<td>0-0.3</td>
<td>0-0.2</td>
<td>4.0-13.5</td>
<td>0-0.6</td>
</tr>
<tr>
<td>9-12MO</td>
<td>1.0-8.5</td>
<td>0-0.3</td>
<td>0-0.2</td>
<td>4.0-13.5</td>
<td>0-0.6</td>
</tr>
<tr>
<td>1-3YR</td>
<td>1.5-8.5</td>
<td>0-0.7</td>
<td>0-0.2</td>
<td>3.0-9.5</td>
<td>0-1.0</td>
</tr>
<tr>
<td>3-6YR</td>
<td>1.5-8.5</td>
<td>0-0.7</td>
<td>0-0.2</td>
<td>2.0-8.0</td>
<td>0-0.8</td>
</tr>
<tr>
<td>6-9YR</td>
<td>1.5-8.0</td>
<td>0-0.7</td>
<td>0-0.2</td>
<td>1.5-7.0</td>
<td>0-0.8</td>
</tr>
</tbody>
</table>
### WHITE CELL DIFFERENTIAL—RELATIVE (%)

- Extrapolated from Pediatric Reference Ranges by Soldin, Brugnara, Gunter, and Hicks 7/13/01

**Eosinophils**

<table>
<thead>
<tr>
<th>Age</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0-5%</td>
</tr>
</tbody>
</table>

**Neutrophils**

<table>
<thead>
<tr>
<th>Age</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7 days</td>
<td>25-70</td>
</tr>
<tr>
<td>7-30 days</td>
<td>15-60</td>
</tr>
<tr>
<td>30-180 days</td>
<td>15-55</td>
</tr>
<tr>
<td>6 mo-3yrs</td>
<td>20-70</td>
</tr>
<tr>
<td>3-6yrs</td>
<td>30-75</td>
</tr>
<tr>
<td>6-12 yrs</td>
<td>40-75</td>
</tr>
<tr>
<td>12-17 yrs</td>
<td>40-75</td>
</tr>
</tbody>
</table>

**Basophils**

<table>
<thead>
<tr>
<th>Age</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0-2%</td>
</tr>
</tbody>
</table>

**Monocytes**

<table>
<thead>
<tr>
<th>Age</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0-10%</td>
</tr>
</tbody>
</table>

**Lymphocytes**

<table>
<thead>
<tr>
<th>Age</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7 days</td>
<td>15-50</td>
</tr>
<tr>
<td>7d-3yrs</td>
<td>20-65</td>
</tr>
<tr>
<td>3yr-6yr</td>
<td>15-55</td>
</tr>
<tr>
<td>6yr-12yr</td>
<td>14-48</td>
</tr>
<tr>
<td>12-17yr</td>
<td>14-40</td>
</tr>
</tbody>
</table>

Instituted: 1999
<Ped ref range> Revised: 2002; 8/2011

### XII. ALPHABETICAL TEST LISTING

**ABG** (ARTERIAL BLOOD GAS)  
**RESPIRATORY CARE**

See BLOOD GAS ANALYSIS

**ABO/RH**  
**BLOOD BANK**

Order As: ABO/RH Newborn, ABO/RH Obstetrics, or ABO/RH Type, as applicable
Patient Preparation: None
Specimen Collection: Minimum Amount: Blood
   Adult: 7 ml in a purple-top tube;
   Infant: Pediatric purple top
Label with (1) patient’s full name and Medical record number or Trauma number exactly as it appears on the Identaband,(2) date of collection (also time if possible), and (3) the circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

IMPORTANT: INCORRECTLY LABELLED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Routine: 4 hr; Stat: 15 min (if Rh-Neg.; 35 min)
Interpretation: N/A

ABT TEST

Order As: ABT Test (Stool)
Patient Preparation: None
Specimen Collection: Visibly bloody rectal discharge or vomitus
Minimum Amount: N/A
Stat?: No
Weekends/Holidays: No
Turnaround Time: 8 hrs.
Interpretation: Negative: No fetal blood present; Positive: Fetal blood present.

ACETONE (Serum)

Order As: Acetone
Patient Preparation: None
Specimen Collection/Minimum Amount:
   • 1 ml in gel barrier tube
   • Gold top microtainer with serum separator – fill ½ full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Routine: 4 hrs; Stat: 1 hr.
Interpretation: Normal - negative.
**ACETONE (Urine)**

Order As: Urinalysis  
Patient Preparation: None  
Specimen Collection: Random urine.  
Minimum Amount: 2 ml  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: **Routine:** 4 hrs; **Stat:** 1 hr.  
Interpretation: Normal - negative.

**ACETAMINOPHEN (Tylenol)**

Order As: Acetaminophen Level  
Patient Preparation: None  
Specimen Collection, Minimum Amount: Blood  
   1. 2 ml in gel barrier tube  
   2. 0.7 ml in red top microtainer  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: **Routine:** 4 hrs.; **Stat:** 1 hour  
Interpretation:  
   Therapeutic range: 5 – 20 ug/ml  
   Liver damage can occur if the value is >200 ug/ml at 4 hours or >50 ug/ml at 12 hours

**ACETYLCHOLINE RECEPTOR ANTIBODY**

Order As: Acetylcholine Antibody  
Synonym: AChR Ab  
Patient Preparation: No isotopes administered 24 hours prior.  
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 5 days (reference lab procedure)  
Interpretation:  
   Negative: 0.0 – 0.24 nmol/L  
   Borderline: 0.24 – 0.40 nmol/L  
   Positive: > 0.40 nmol/L
**ACT (ACTIVATED CLOTTING TIME) POINT-OF-CARE TEST SITES**

Performed with Point-of Care technology only on those sites authorized by the Pathology Department.
Patient Preparation: Identify patient by means of ID bracelet.
Specimen collection: Whole blood
Performing test/Interpretation: Refer to test procedures in test site Procedure Manual.

**ACTH (ADRENOCORTICOTROPHIC HORMONE) CHEMISTRY**

Order As: ACTH
Patient Preparation: None
Specimen Collection/Minimum Amount: Blood into 2 Lavender Top Tubes on ice.
** Draw between 6 am – 10:30 am**
Stat?: No
Weekends/Holidays: Drawn - yes; Tested - no.
Turnaround Time: 3-7 days (Reference Lab Procedure)
Interpretation: Normal: 10 – 60 pg/ml

**ACTIVATED PROTEIN C RESISTANCE (APCR) HEMATOLOGY**

Order As: APCR
Patient Preparation: Patient must not be on Coumadin.
Specimen Collection, Minimum Amount:
   **Exactly** 2.7 ml blood in 5 ml Blue Top Tube (Hemogard plastic)
   Note: invert to mix anticoagulant with specimen.
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 hours
Interpretation: Normal: 2.0 – 5.0

**ADAMS 13 (VW CLEAVING PROTEASE PROFILE) HEMATOLOGY**

Order as: Miscellaneous test – Adams 13
Patient Preparation: None
Specimen Collection/minimum amount:
   2 Blue top tubes (Hemogard plastic) with exactly 2.7 ml blood in each
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 1 week (Reference laboratory procedure)
Interpretation: See Report
**ALBUMIN**

**CHEMISTRY**

Order As: Albumin  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
  1. 1 ml blood in gel barrier tube  
  2. Gold Top Microtainer with serum separator – fill 1/2 full.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: 4 hrs.  
Interpretation: Normal: 3.5 - 5.6 gm/dl

**ALCOHOL, SERUM**

**CHEMISTRY**

Order As: Alcohol  
Synonyms: Ethanol, ethyl alcohol  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
  IMPORTANT: DO NOT PREP THE SKIN WITH AN ALCOHOL SWAB.  
  For Police: 1 full grey top tube (for whole blood analysis)  
  For in-house testing: 5 ml blood in gel barrier tube.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Routine: 4 hrs.; Stat: 1 hour  
Interpretation: Consult Pathologist.

**ALDOLASE**

**CHEMISTRY**

Order As: Aldolase  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
  3 ml in red top tube (rev. 6/2012)  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 3 days (Reference Lab Procedure)  
Interpretation: Normal: 0 – 16 years: <14.5 U/L  
  >17 years: <7.7 U/L

**ALDOSTERONE, SERUM**

**CHEMISTRY**

Order As: Aldosterone, Serum
ALDOSTERONE, URINE

Order As: Aldosterone (24 hr. urine)
Patient Preparation: None
Specimen Collection, Minimum Amount: 24 hr. urine collection.

NOTE: 50% acetic acid must be added to the specimen container prior to collection. Call the Chemistry Section at ext. 4862. (revised: 6/2012)
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 8 days (Reference Lab Procedure)
Interpretation: Normals: Normal salt diet: 2 - 21 ug/24 hr.

ALKALINE PHOSPHATASE

Order as: Alkaline Phosphatase
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. 1 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator - fill 1/2 full.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 4 hrs.
Interpretation: Children: 0-3 yr: 145-320 IU/L
3-6 yr: 150-380 IU/L
6-9 yr: 175-420 IU/L
9-11 yr: 135-530 IU/L
11-13 yr: 200-495 IU/L
13-15 yr: 130-525 IU/L
15-19 yr: 65-260 IU/L
Adult: 43-122 IU/L

ALPHA-1-ANTI-TRYPSIN

Order as: Alpha-1-Antitrypsin
Patient Preparation: None
Specimen Collection, Minimum Amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 - 7 days (Reference Lab Procedure)
Interpretation: Normals: Average sodium diet:
Recumbent 1.0 - 16.0 ng/dl
Standing 4.0 - 31.0 ng/dl
Adrenal Vein 200 - 800 ng/dl
Order As: Alpha 1 Anti-Trypsin
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in red top tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 1 week (Reference Lab Procedure)
Interpretation: Normal: 100 - 190 mg/dl

ALPHA-1 ANTI-TRYPSIN PHENOTYPE

Order As: Alpha-1 Antitrypsin Genotype
Patient Preparation: None
Specimen Collection, Minimum Amount: 10 ml blood in a Red Top Tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 10 days (Reference Lab Procedure)
Interpretation: Normal: See report.

ALPHA-2 ANTI-PLASMIN

Order As: Alpha-2 Anti-Plasmin
Patient Preparation: None
Specimen Collection: Minimum Amount:
Exactly 2.7 ml blood in 5 ml Blue Top Tube (Hemogard plastic)
Invert to mix anticoagulant with specimen.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 hours
Interpretation: Normal: 80 - 140%

ALPHA FETOPROTEIN, AMNIOTIC FLUID

Order as: Miscellaneous – Alpha Fetoprotein, amniotic fluid
Patient Preparation, Specimen Collection: Contact Ultrasound, ext. 2200
Minimum Amount: 4 ml amniotic fluid
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 5 days (Reference Lab Procedure)
Interpretation: Normal: Reported as "Normal".
**ALPHA FETOPROTEIN (AFP), SERUM - TUMOR MARKER**  
CHEMISTRY

Order as: AFP Tumor marker  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hours  
Interpretation: 0 – 8.0 ng/dl

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**ALPHA FETOPROTEIN (AFP) TETRA PROFILE**  
CHEMISTRY

Order as: Miscellaneous - Alpha fetoprotein AFP Maternal  
Patient Preparation: Complete Maternal Prenatal Screening form Specimen Collection/minimum Amount: 5 ml in gel barrier tube  
Stat?: No  
Weekends/Holidays: will accept specimen  
Turnaround Time: 3-5 days (Reference Lab Procedure)  
Interpretation: see report

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**ALPHA GLOBIN GENE ANALYSIS**  
HEMATOLOGY

Order as: Miscellaneous test - Alpha Globin Gene analysis  
Patient Preparation: None  
Specimen Collection/minimum amount: 2 lavender top tubes (EDTA)  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround time: 1 week (Reference Lab Procedure)  
Interpretation: See Report

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**ALT (ALANINE AMINOTRANSFERASE)**  
CHEMISTRY

Order As: ALT  
Formerly: SGPT  
Patient Preparation: None  
Specimen Collection/Minimum Amount:3 ml blood in gel barrier tube  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: 4 hrs.  
Interpretation: Normal: Male: 0 - 55 IU/l ; Female: 0 - 45 IU/l
AMIKACIN LEVEL

Order as: Amikacin Peak or Trough, as applicable
Patient Preparation: Patient must have received the aminoglycoside listed.
Specimen Collection/Minimum amount:

3 ml blood in a Red top Tube (DO NOT USE A GEL BARRIER TUBE)

Peak Level:
- Drug given I.M.: Draw blood 1 hr after injection
- Drug given I.V.: Draw blood 30 min after the end of a 30 min IV infusion or immediately after a 60 min IV infusion.

Trough level: Draw blood just prior to administration of next dosage of amikacin.

NOTE: patient should have been on amikacin for 24 hours prior to collecting a trough specimen.

Stat? No
Weekends/Holidays? Yes
Turnaround Time: Routine: 4 hours

Interpretation: Amikacin peak: 20.0 – 30.0 ug/ml; Potentially Toxic: >30.0 ug/ml
   Amikacin trough: 1.0 – 7.0 ug/ml; Potentially Toxic: >7.0 ug/ml
   Amikacin random: 1.0 – 30.0 ug/ml

AMINO ACID QUANTITATION

Order As: Amino Acid Quant (24H urine)
Patient Preparation: None
Specimen Collection, Minimum Amount: 24 hr. urine collection
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3 weeks (Reference Lab Procedure)

Interpretation: Normal: No abnormal amino acids, negative for presence intense bands.

AMMONIA, BLOOD

Order As: Ammonia
Patient Preparation: None
Specimen Collection/Minimum Amount:

1 full Green Top Tube (blood)

Put tube on ice and transport immediately to Lab.

DO NOT SEND THIS SPECIMEN THROUGH THE PNEUMATIC TUBE SYSTEM.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 4 hr.

Interpretation: Normal: 9 - 33 umol/L
AMOEBA, ANTIBODY  MICROBIOLOGY

Order As: Amoeba Ab  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 5 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: No  
Turnaround Time: 48 - 72 hrs (Reference Lab Procedure)  
Interpretation: Normal: Negative.  **NOTE:** Any positive titer is significant.

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AMYLASE (BODY FLUID)  CHEMISTRY

Order As: Amylase Body Fluid  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 5 ml fluid in sterile container  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hours  
Interpretation: No established normals.

---------------------------

AMYLASE (Serum)  CHEMISTRY

Order As: Amylase  
Patient Preparation: none  
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: **Stat:** 1 hr; **Routine:** 4 hrs  
Interpretation: Normal: 25-115 u/L

---------------------------

AMYLASE (Urine)  CHEMISTRY

Order As: Amylase (urine)  
Patient Preparation: None  
Specimen Collection, Minimum Amount: Timed specimen - minimum 2 hr. urine sample.  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hrs.  
Interpretation: Normal: 5-33 units/2 hours ; 59-401 units/24 hours

---------------------------

AMYLASE ISOENZYMES  CHEMISTRY
Order As: Miscellaneous - Amylase Isoenzymes
Patient Preparation: None
Specimen Collection, Minimum Amount: 10 ml blood in gel barrier tube.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 1 week (Reference Lab)
Interpretation: Normal: see report

ANTIBODY SCREENING

Order As: Antibody Screening
Synonym: Indirect antiglobulin test, Indirect coombs
Includes: Antibody identification if screen is positive.
Patient Preparation: None
Specimen Collection, Minimum Amount: 7 ml blood in a purple-top tube. Label with(1) patient’s full name and Medical Record number or Trauma number exactly as it appears on the Identaband, (2) date of collection also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 45 min.; Routine: Same day
Interpretation: Normal: Negative

ANTI-CARDIOLIPIN ANTIBODY (IgG, IgM, IgA)

Order As: Anti-cardiolipin Antibody
Synonyms: ACA, Antiphospholipids
Patient Preparation: none
Specimen Collection/Minimum Amount: 1 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: Once per week (batched)
Interpretation:
IgG: Negative: 0-15 GPL; Indeterminate: 15.1 – 20.0 GPL; Positive: >20 GPL
IgM: Negative: 0-12.5 MPL; Indeterminate: 12.6 – 20.0 MPL; Positive: >20 MPL
IgA: Negative: 0-12 APL; Indeterminate: 12.1 – 20.0 APL; Positive: > 20.0 APL
### ANTI-DNA - See DNA ELISA

**HEMATOLOGY**

<table>
<thead>
<tr>
<th>Order As:</th>
<th>Anti-DNA ELISA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes:</td>
<td>Anti-DNA antibodies to Smith antigen and RNP</td>
</tr>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen Collection/Minimum Amount:</td>
<td>2 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat?:</td>
<td>No</td>
</tr>
<tr>
<td>Weekends/Holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>Batched test performed once per week</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Normal: Negative</td>
</tr>
</tbody>
</table>

### ANTI-ENA (ANTI-Sm AND ANTI-RNP)

**HEMATOLOGY**

<table>
<thead>
<tr>
<th>Order As:</th>
<th>Anti-ENA (SM,RNP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes:</td>
<td>Titters for antibodies to Smith antigen and RNP</td>
</tr>
<tr>
<td>Synonyms:</td>
<td>Anti-extractable Nuclear Antigens</td>
</tr>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen Collection/Minimum Amount:</td>
<td>2 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat?:</td>
<td>No</td>
</tr>
<tr>
<td>Weekends/Holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>Batched test performed once per week</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Normal: Negative</td>
</tr>
</tbody>
</table>

### ANTI-GLIADIN ANTIBODIES

**CHEMISTRY**

<table>
<thead>
<tr>
<th>Order As:</th>
<th>Anti-Gliadin Antibodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen Collection/Minimum Amount:</td>
<td>4 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat?:</td>
<td>No</td>
</tr>
<tr>
<td>Weekends/Holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>5 days (Reference Lab procedure)</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Anti-Gliadin IGG: 0-19 units; Anti-Gliadin IGA: 0-19 units</td>
</tr>
</tbody>
</table>

### ANTI-HISTONE

**HEMATOLOGY**

<table>
<thead>
<tr>
<th>Order As:</th>
<th>Anti-Histone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms:</td>
<td>Drug-induced lupus antibodies</td>
</tr>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen Collection/Minimum Amount:</td>
<td>3 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat?:</td>
<td>No</td>
</tr>
<tr>
<td>Weekends/Holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>Batched test performed once per week</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Normal: Negative</td>
</tr>
</tbody>
</table>

### ANTI-MICROSOMAL ANTIBODIES

**CHEMISTRY**

See the requirements for **ANTITHYROID ANTIBODIES**
ANTI-MITOCHONDRIAL ANTIBODY (AMA)  

Order As: Anti-mitochondrial Antibody  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: Batched test performed twice per week  
Interpretation: Normal: <1:10

----------------------------------------------------------------------------------------------------------------------

ANTI-NUCLEAR ANTIBODY SCREEN  

Order As: Antinuclear antibody  
Synonyms: ANA, FANA  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: Batched 2 times per week  
Interpretation: Screen normal: 0 – 19.9 U/ml. If screen is positive, a titer will be performed and reported. Normal titer: <1:40

Revised 6/7/13

----------------------------------------------------------------------------------------------------------------------

ANTI-PARIETAL CELL ANTIBODY  

Order As: Anti Parietal Cell Antibody  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 72 hrs. (Reference Lab Procedure)  
Interpretation: Negative = less than 24.9

----------------------------------------------------------------------------------------------------------------------

ANTI-PHOSPHOLIPID SYNDROME PANEL  

Includes:  
1. ACLA (anti-cardiolipin IgG, IgM, IgA)  
2. Beta 2 Glycoprotein (IgG, IgM, IgA)  
3. Lupus Anticoagulant

Tests can also be ordered separately

Order as: Anti-Phospholipid Panel  
Patient Preparation: None  
Specimen type: Whole blood  
Collection Container: 2 x SST or Red Top and 3 x Blue top  
Minimum Volume: 1.0 mL in each tube  
Rejection criteria: Gross Hemolysis, Gross Lipemia.
**TEST DETAILS**  
Performance: Tuesdays  
STAT Availability? No  
Performing Laboratory: HUMC  
Laboratory Analytical Time: 1 - 7 days  
Stability Ambient: 8 hours Refrigerated: 7 days Frozen: -20°C for 1 month  
Interpretation: See Individual Tests.

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-PHOSPHATIDYLSTERINE IgG, IgM</td>
<td>HEMATOLOGY</td>
</tr>
<tr>
<td>Order: on Miscellaneous Lab slip</td>
<td></td>
</tr>
<tr>
<td>Synonym: APTS</td>
<td></td>
</tr>
<tr>
<td>Patient Preparation: None</td>
<td></td>
</tr>
<tr>
<td>Specimen Collection/minimum amount: 7 ml blood in a gel barrier tube</td>
<td></td>
</tr>
<tr>
<td>Stat? No</td>
<td></td>
</tr>
<tr>
<td>Weekends/holidays: Will accept specimen</td>
<td></td>
</tr>
<tr>
<td>Turnaround Time: 1 week (Reference Lab procedure)</td>
<td></td>
</tr>
<tr>
<td>Interpretation: Normal: 0-16 GPS, 0-22 MPS units</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-SCL 70 (Anti-scleroderma antibodies)</td>
<td>HEMATOLOGY</td>
</tr>
<tr>
<td>REQUIREMENTS SAME AS FOR ANTI-ENA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-SSA, SSB</td>
<td>HEMATOLOGY</td>
</tr>
<tr>
<td>Synonyms: Sjogren’s antibodies, Anti-Ro, Anti-La</td>
<td></td>
</tr>
<tr>
<td>REQUIREMENTS SAME AS FOR ANTI-ENA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-SMOOTH MUSCLE ANTIBODY (ASMA)</td>
<td>HEMATOLOGY</td>
</tr>
<tr>
<td>Order As: Anti-smooth muscle antibody</td>
<td></td>
</tr>
<tr>
<td>Patient Preparation: None</td>
<td></td>
</tr>
<tr>
<td>Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube</td>
<td></td>
</tr>
<tr>
<td>Stat?: No</td>
<td></td>
</tr>
<tr>
<td>Weekends/Holidays: Will accept specimen</td>
<td></td>
</tr>
<tr>
<td>Turnaround Time: Batched test performed twice per week.</td>
<td></td>
</tr>
<tr>
<td>Interpretation: Normal: Less than 1:10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-STREPTOLYSIN &quot;O&quot; (ASO)</td>
<td>CHEMISTRY</td>
</tr>
<tr>
<td>Order As: ASO Titer</td>
<td></td>
</tr>
<tr>
<td>Patient Preparation: None</td>
<td></td>
</tr>
</tbody>
</table>
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours (Monday – Friday)
Interpretation: Normal: 0 – 200 IU/ml

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ANTI-STRATIED MUSCLE ANTIBODY CHEMISTRY

Order As: Anti-Striated Muscle Antibody
Synonyms: Anti-myocardial antibodies
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days
Interpretation: Normal: <1:60

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ANTI-THROMBIN III HEMATOLOGY

Order As: Anti-Thrombin 3
Patient Preparation: None
Specimen Collection, Minimum Amount:
  
  **Exactly** 2.7 ml blood in 5 ml Blue Top Tube (Hemogard plastic)
  
  **NOTE:** Invert to mix anticoagulant with specimen
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hrs.
Interpretation: Normal: 80 - 120%

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ANTI-TYROGLOBULIN CHEMISTRY

SEE REQUIREMENTS FOR ANTI-TYROID ANTIBODIES

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ANTI-TYROID ANTIBODIES CHEMISTRY

Order As: Antithyroid antibodies
Includes: Thyroglobulin and TPO (Thyroid Peroxidase) antibodies.
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (Reference Lab procedure)
Interpretation: Normal: Anti-Thyroglobulin: 0 – 40 IU/ml
Anti-TPO: 0 – 34 IU/ml

ARSENIC

Order As: Arsenic Level
Patient Preparation: None
Specimen Collection, Minimum Amount:
5 ml blood in Navy Blue Tube (trace metal-free tube, obtain from the Diagnostic Technicians at ext. 4829)
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3 working days (Reference Lab)
Interpretation: 2 – 23 ug/L

ASO TITER

See ANTI-STREPTOLYSIN O

ASPERGILLUS ANTIBODY

Order As: Aspergillus Ab
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 - 10 days (Reference Lab Procedure)
Interpretation: Normal- Negative
Note: Any significant rise in titer from acute to convalescent phase serum is diagnostic of infection.

ASPERGILLUS ANTIGEN

Order as: Aspergillus Antigen
Synonyms: Galactomannon
Patient Preparation: None
Specimen collection/Minimum amount: 4 ml in gel barrier tube
NOTE: Specimen tube CANNOT BE SHARED for any other test
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround time: Specimens are batched; run 2 times per week
Interpretation: Normal: Less than 0.5

AST (ASPARTATE AMINOTRANSFERASE)

CHEMISTRY
Order As: AST
Synonym: Formerly SGOT
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. 1 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator, fill 1/2 full.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal 10-30 IU/L

BACTERICIDAL LEVEL, SERUM - See SCHLICHTER TEST

BARBITURATES, QUANTITATIVE CHEMISTRY

Order As: Barbiturates – Quant
Includes: amobarbital, butabarbital, butalbital, pentobarbital, phenobarbital, secobarbital.
Patient Preparation: None
Specimen Collection, Minimum Amount: Blood in two (2) gray top tubes.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 48 hrs. (Reference Lab Procedure)
Interpretation: Normal: Negative

BARTONELLA ANTIBODY - See CAT SCRATCH DISEASE ANTIBODY

BASIC METABOLIC PANEL (BMP)
Order As: BMP (All tests in this panel are included in Comprehensive Metabolic Panel, ordered as CMP)
Synonym: Mini-Screen, Chem 8
Includes: Glucose, BUN, Calcium, Creatinine, Sodium, Potassium, Chloride, CO2
Patient Preparation: Preferable if patient is fasting
Specimen Collection: Minimum Amount:
1) 3 ml blood in gel barrier tube
2) Gold top microtainer with serum separator - full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normals:
Glucose: 68-122 mg/dl (fasting)
Calcium: 8.4-10.2 mg/dl
BUN: 5-24 mg/dl
Creatinine*: 0.3-1.5 mg/dl
Sodium: 134-146 mEq/L
Potassium: 3.5-5.2 mEq/L
Chloride: 95-108 mEq/L
CO2: 24-32 mEq/L

*Note: GFR: <60 ml/min/1.73 sq.m. may indicate chronic kidney disease.

BENCE-JONES PROTEIN - See PROTEIN ELECTROPHORESIS (URINE)

BETA 2 GLYCOPROTEIN ANTIBODIES (IGG, IGA, IGM)  HEMATOLOGY

Order as: Beta-2 glycoprotein Antibodies
Patient Preparation: None
Specimen type: Whole blood
Collection Container: SST or Plain red
Minimum Volume: 1.0 mL
Rejection criteria: Gross Hemolysis, Gross Lipemia.

TEST DETAILS
Performance: Tuesdays
STAT Availability? NO
Performing Laboratory: HUMC
Laboratory Analytical Time: 1 - 7 days
Stability Ambient: 8 hours Refrigerated: 7 days Frozen: -20C for 1 month

INTERPRETATION OF RESULTS
A positive result indicates the presence of Beta 2 GPI antibodies and suggests the possibility of certain autoimmune disease thrombotic disorders, such as those secondary to systemic lupus erythematosus or other lupus-like thrombotic diseases. A negative result indicates no Beta 2 GPI antibodies or levels below the detection limit of the assay cutoff.

BETA-2 MICROGLOBULIN (Serum)  CHEMISTRY

Order as: Beta-2 Microglobulin Antibodies
Patient Preparation: None
Specimen Collection/Minimum amount: 3 ml blood in gel barrier tube
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3-4 days (Reference Lab Procedure)
Interpretation: normal: >18 years (M/F): 0.7 – 1.8 mcg/ml
Reference ranges below 18 years of age will appear on the printed patient chart and in the EMR.

BETA HCG TITER (QUANTITATIVE)

Order As: BHCG Quantitative
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation:
Non-pregnant: Normal: Less than 5 mIU/ml-Absence of trophoblastic disease, absence of ectopic pregnancy.
For determination of Pregnancy:
(1) Less than 5 MIU/mL (negative)
(2) 5 – 25 MIU/mL (May indicate early pregnancy depending on clinical correlation. If necessary, an additional blood sample should be drawn 48 hours later for repeat testing)
(3) Greater than 25 MIU/mL (positive)

NOTE: There are reports of women receiving unnecessary medical treatment and surgery based on physicians’ diagnoses made solely upon BhCG results which were falsely elevated. For example, infrequently, hCG levels appear consistently falsely elevated due to the presence of heterophilic antibodies, human anti-mouse antibodies, nonspecific protein binding, hCG-like substances, and red blood cell interference, among other causes. These interfering substances may cause false results over the entire range of the assay, not just at low levels, and may indicate the presence of hCG when there is none. These same causes may result in consistently falsely depressed levels. For diagnostic purposes, hCG results should be used in conjunction with other data, such as clinical symptoms, results of other tests, clinical impressions, etc.

BILIRUBIN, DIRECT

Order As: Bilirubin Direct
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal: 0-0.4 mg/dl

BILIRUBIN, TOTAL

Order As: Bilirubin Total
Patient Preparation: None
Specimen Collection/Minimum Amount: 1 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal: 0.6 - 1.0 mg/dl

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**BLASTOMYCES ANTIBODY**

Order As: Blastomyces Ab
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 - 10 days (reference Lab Test)
Interpretation: Normal: Negative

*Note:* Any significant rise in titer from acute to convalescent phase serum is diagnostic of infection.

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**BLOOD CULTURE** - See Microbiology Section A

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**BLOOD GAS ANALYSIS**

Performed in the Blood Gas Labs of the Respiratory Care Dept.
Order as applicable: Mixed venous, Arterial blood, Scalp pH, capillary, cord pH.

The following sites should call requests to the appropriate Respiratory Care beeper:
- SICU – b.7012, MICU b.7011, CSICU b.7013, NICU b.7010, ETD b.7015.
- All other sites call ext. 2333 for appropriate beeper number.

Patient preparation: Identify patient by ID bracelet.
Specimen collection: Scalp pH drawn by M.D.
- Mixed venous specimens drawn by RN/M.D.
- All other specimens will be collected by Respiratory Therapists.

Stat? Yes
Weekends/Holidays: Yes
Turnaround Time: 15 minutes
Interpretation: Normals:
- Arterial (Adult): pH 7.35-7.45; pCO2 35-45 mm Hg; pO2 80-100 mm Hg; HCO3 22-24 mEq/L; BE 0 ± 2 mEq/L.
- Mixed venous (Adult): pH 7.32-7.42; pCO2 40-60 mm Hg; pO2 25-40 mmHg; HCO3 22-26 mEq/L; BE (-2)-(+2)mEq/L
- Cord pH: 7.3 – 7.45
- Scalp pH: 7.3 – 7.45
- Capillary: pH 7.34-7.45; pCO2 30-50 mm Hg; pO2 40-90 mm Hg
- ETD only: Sodium: 130-146 mmol/L; Potassium: 3.2-5.1 mmol/L
- NICU/PICU only: Ionized calcium: 1.0-1.5 mmol/L
BLOOD SMEARS FOR PARASITES (THICK AND THIN)

See MICROBIOLOGY SECTION I

BMP (Basic Metabolic Panel) - See Basic Metabolic Panel CHEMISTRY

BNP (Beta-type natriuretic peptide) CHEMISTRY

Order as: BNP
Patient Preparation: None
Specimen Collection: 1 full Lavender-top tube (blood)
Stat? Yes
Weekends/Holidays: Yes
Turnaround time: Stat: 1 hour
Routine: Test must be completed within 4 hrs of draw.

Interpretation:

BNP is FDA approved to be used as an aide in the diagnosis of heart failure (HF).
An elevated BNP correlates with elevated ventricular filling pressures (PCWP) as occurs with systolic and diastolic dysfunction, and helps to confirm a diagnosis of HF; it should be interpreted in conjunction with clinical findings and other diagnostic testing. An elevated BNP may alternatively reflect right ventricular failure. The HUMC Department of Cardiology recommends the following guidelines:

<table>
<thead>
<tr>
<th>Limits of detection:</th>
<th>&lt;5 pg/ml -- &gt;5000pg/ml *</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNP level</td>
<td>Interpretation:</td>
</tr>
<tr>
<td>&lt;100 pg/ml</td>
<td>Highly unlikely that patient’s symptoms result from systolic or diastolic dysfunction.</td>
</tr>
<tr>
<td>&gt;100 - &lt;300 pg/ml</td>
<td>HF likely; correlates with NYHA Class I (Pts with Left Ventricular Dysfunction and no acute CHF may have baseline BNP levels of 141(±31).</td>
</tr>
<tr>
<td>&gt;300 - &lt; 600 pg/ml</td>
<td>Correlates with mild - moderate HF; usually reflects NYHA Class II. Pts who present with dyspnea and BNP level &gt;480 have a nearly 30-fold increased risk for a cardiac event in the next 6 months.</td>
</tr>
<tr>
<td>&gt;600 - &lt; 1000 pg/dl</td>
<td>Correlates with moderate-severe HF; usually reflects NYHA Class III</td>
</tr>
<tr>
<td>&gt; 1000 pg/dl</td>
<td>Correlates with very severe congestive HF; usually reflects NYHA Class IV</td>
</tr>
</tbody>
</table>

* In pts with elevated serum creatinine BNP levels may be exaggerated; In dialysis pts, BNP may be more closely related to structural abnormalities and does not necessarily correlate with
**BORDETELLA PERTUSSIS ANTIBODY PANEL**  
**MICROBIOLOGY**

Order As: B. pertussis Ab panel  
Includes: B. pertussis Ab, IgA, IgG and IgM, Quantitative  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 7 days (reference lab procedure)  
Interpretation: Negative titer: Less than 1:20.

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**BORDETELLA PERTUSSIS PCR**  
**MICROBIOLOGY**

Order As: Miscellaneous with comment “Pertussis PCR”  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
Using a nasopharyngeal culture swab, insert through nasal passage into the nasopharyngeal area.  
Stat?: No  
Weekends/Holidays: No  
Turnaround Time: Monday – Friday, 24 hr. TAT  
Interpretation: Normal: Negative

---

**BREAST CANCER PROFILE**  
**ANATOMICAL PATHOLOGY**

Order as: Breast Cancer Profile. This profile will be performed on invasive breast cancer cases at the discretion of the pathologist.  
Includes: Estrogen Receptor, Progesterone Receptor, p53, Ki67 proliferation index, HER-2/neu.  
Specimen collection: Place surgical specimen in container of 10% neutral buffered formalin. Testing can also be performed on archival material.  
Interpretation: Interpretive report will be issued. Contact Christopher Koenig, MD at ext. 4889 with questions.

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**BUFFY COAT SMEAR**  
**HEMATOLOGY**

Order As: Buffy Coat Smear  
Patient Preparation: None  
Specimen Collection: 1 Lavender Top Tube (blood). Invert to mix anticoagulant with specimen.
Minimum Amount:
1. 1 ml in 5 ml Lavender Top Hemogard tube. (LTT)
2. Micro specimens to be collected by Diagnostic Techs
Stat?: No
Weekends/Holidays: No
Turnaround Time: 4 hrs.
Interpretation: Same as for differential

BUN (Urea Nitrogen)  
Order As: BUN  
Synonym: Blood urea nitrogen, urea nitrogen  
Patient Preparation: None  
Specimen Collection/Minimum Amount:
1. 1 ml blood in gel barrier tube  
2. Gold Top Microtainer with serum separator - fill 1/2 full  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 4 hours  
Interpretation: Normal: 5-24 mg/dl

C1 ESTERASE, FUNCTIONAL  
Order as: C1 Esterase, Functional  
Patient preparation: None  
Specimen collection/minimum amount: 3 ml in red top tube, collect and maintain on ice.  
Stat?: No  
Weekends/Holidays: will accept specimen  
Turnaround time: 5 days (Reference Lab test)  
Interpretation: Normal: greater than 67%  
Abnormal: less than 41%

C1 ESTERASE, INHIBITOR  
Order as: C1 Esterase, Inhibitor  
Patient preparation: None  
Specimen collection/minimum amount: 3 ml in gel barrier tube.  
Stat?: No  
Weekends/Holidays: will accept specimen  
Turnaround time: 2 days (Reference Lab test)  
Interpretation: 19 – 37 mg/dl

C3, C4
Order As: C3 and/or C4 as applicable  
Synonyms: Complement C3, C4  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 2 ml blood in Red Top Tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: Monday – Friday, day shift  
Interpretation: Normals are age-dependent  
  C3 (Adult) - 86-184 mg/dl  
  C4 (Adult) - 20-59 mg/dl

CA 19-9: See CARBOHYDRATE ANTIGEN 19-9  
CA 15-3: See CANCER ANTIGEN 15-3  
CA 27.29: See CANCER ANTIGEN 27.29  
CA 125: See CANCER ANTIGEN 125

CALCITONIN

Order As: Calcitonin  
Synonym: Thyrocalcitonin  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 21 days (Reference Lab Procedure)  
Interpretation: Basal: Male: < 16 pg/ml  
  Female: < 8 pg/ml  
  Peak calcium infusion: Male: ≤ 130 pg/ml  
  Female: ≤ 90 pg/ml

CALCIUM (Serum)

Order As: Calcium  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
  1. 1 ml blood in gel barrier tube  
  2. Gold Top Microtainer with serum separator - fill 1/2 full.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr.; Routine: 4 hrs  
Interpretation: Normal: 8.4 - 10.2 mg/dl

CALCIUM (urine)

Order As: Calcium (24 hr urine)
Patient Preparation: Check to see if ordering physician requires a specific calcium diet.
Specimen Collection/Minimum Amount: 24 hr. urine collection with 6 N HCl as preservative. Call Chemistry x 4862.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 2 days (Reference Lab Procedure)
Interpretation: Normal for persons with average calcium intake of 600-800mg/day:
   Male: 25 - 300 mg/24 hours
   Female: 20 - 275 mg/24 hours

-----------------------------------------------

CALCIUM, IONIZED CHEMISTRY

Order as: Calcium, Ionized (Blood)
Patient Preparation: None
Specimen collection, Minimum amount:
   1. 10 ml blood in GREEN TOP TUBE.
   2. Green-top Pediatric tube
Stat? Yes Weekends/Holidays? Yes
Turnaround Time: Stat: 1 hr; Routine: 4 hrs
Interpretation: Normal: 4.75 – 5.30 mg/dl

NOTE: This test can also be performed by Respiratory Care ONLY in NICU and PICU when ordered in conjunction with Blood Gases.

-----------------------------------------------

CALCULUS, QUALITATIVE CHEMISTRY

Order As: Kidney stone analysis
Patient Preparation: None
Specimen Collection/Minimum Amount: Calculus
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 days (Reference Lab Procedure)
Interpretation: N/A

-----------------------------------------------

CANCER ANTIGEN 15-3 CHEMISTRY

Order as: CA 15-3
Patient Preparation: None
Specimen collection/minimum amount: 4 ml blood in gel barrier tube
Stat? No
Weekends/holidays: Will accept specimen
Turnaround time: 3-5 days (Reference lab procedure)
Interpretation: < 30 units/ml

-----------------------------------------------
CANCER ANTIGEN 27.29

Order as: CA 27.29
Synonym: Cancer antigen 27.29
Patient Preparation: None
Specimen collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 2 days (Reference lab procedure)
Interpretation: For males and females 18 years of age or older:
< 38 units/ml

CANCER ANTIGEN 125

Order as: CA 125
Patient Preparation: None
Specimen collection/minimum amount: 3 ml blood in gel barrier tube
Stat? No
Weekends/holidays: Will accept specimen
Turnaround Time: 24 hours (Monday – Friday)
Interpretation: 0 - 35.0 U/ml

CARBAMAZEPINE

Order As: Carbamazepine
Synonym: Tegretol
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in red top tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 24 hours
Interpretation: Normal: Therapeutic: 4-12 ug/dl

CARBOHYDRATE ANTIGEN 19-9

Order as: CA 19-9
Synonym: Carbohydrate antigen 19-9
Patient Preparation: None
Specimen Collection/minimum amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3 days (Reference lab procedure)
CAROTENE CHEMISTRY
Order As: Carotene Serum
Patient Preparation: None
Specimen Collection, Minimum Amount: 10 ml blood in gel barrier tube.
Wrap specimen immediately in aluminum foil to protect from light.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (Reference Lab Procedure)
Interpretation: Normal: 10-85 ug/dl

CATECHOLAMINES, FRACTIONATED (URINE) CHEMISTRY
Order As: Catecholamines - fract (urine)
Patient Preparation: None
Specimen Collection, Minimum Amount: 24 hr. urine collection
NOTE: 50% acetic acid must be added to the container prior to specimen collection. Call Chemistry at ext. 4862. (revised: 6/2012)
Stat?: No
Weekends/Holidays: Not tested.
Turnaround Time: 3 days
Interpretation: VMA: 0-7.5 mg/24 hours
Epinephrine: 0-20 ug/24 hours
Norepinephrin: 0-135 ug/24 hours
Dopamine: 0-510 ug/24 hours

CAT SCRATCH DISEASE ANTIBODY MICROBIOLOGY
Order As: Bartonella Ab
Includes: Bartonella henselae IgG/IgM; B. quintana IgG/IgM
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 days (reference lab procedure)
Interpretation: Normal: Negative

CBC ONLY HEMATOLOGY
Order As: CBC only
Includes: Complete CBC: WBC, RBC, Hgb, Hct, MCH, MCV, MCHC, RDW, Platelet count, and MPV.

**NOTE: Does NOT include an automated WBC differential.**

Patient Preparation: None
Specimen Collection/ Minimum Amount:
1. 1 ml blood in 5 ml purple top tube (Hemogard)
2. Microspecimens to be collected by Diagnostic Techs.
   Invert to mix anticoagulant with specimen.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: **Stat:** 1 hour; **Routine:** 4 hr.

Interpretation (effective 1-27-2014):

<table>
<thead>
<tr>
<th></th>
<th>Male (18 yr and older)</th>
<th>Female (18 yr and older)</th>
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<tbody>
<tr>
<td>WBC</td>
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<tr>
<td>HGB</td>
<td>13 - 17 gm/dl</td>
<td>12 – 15.5 gm/dl</td>
</tr>
<tr>
<td>HCT</td>
<td>38.7 - 50%</td>
<td>36 - 46%</td>
</tr>
<tr>
<td>MCV</td>
<td>80 – 100 fL</td>
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</tr>
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<td>MCH</td>
<td>25 - 34 pg</td>
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<td>11.5 - 15.5%</td>
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<tr>
<td>MPV</td>
<td>7.4 - 10.4 fL</td>
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<tr>
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<td>135 - 430 x 10^3/mcL</td>
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NOTES:
1. For age-specific reference ranges, refer to the individual patient report.
2. Select abnormal CBC results will be reviewed by a pathologist.

-------------------------------------------------------------------------------------------------

**C.B.C. with AUTOMATED DIFFERENTIAL**  

**HEMATOLOGY**

Order As: CBC with Auto Diff
Includes: Complete CBC (WBC, RBC, Hgb, Hct, MCH, MCV, MCHC, RDW, Platelet count, MPV) and automated differential WBC count.

**NOTE:** When the automated differential is not valid due to instrument limitations, a manual differential will be performed.

Patient Preparation: None
Specimen Collection/ Minimum Amount:
1. 1 ml blood in 5 ml purple top tube (Hemogard)
2. Microspecimens to be collected by Diagnostic Techs.
   Invert to mix anticoagulant with specimen.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: **Stat:** 1 hour; **Routine:** 4 hr.

Interpretation (effective 1-27-2014):

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NOTES:
1. For age-specific reference ranges, refer to the individual patient report.
2. Select abnormal CBC results will be reviewed by a pathologist.

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**CBC with MANUAL DIFFERENTIAL**

Order As: CBC with Manual Diff
Includes: Complete CBC (WBC, RBC, Hgb, Hct, MCH, MCV, MCHC, RDW, Platelet count, MPV) and blood smear for microscopic examination with manual differential WBC count.

Patient Preparation: None
Specimen Collection/ Minimum Amount:
1. 1 ml blood in 5 ml purple top tube (Hemogard)
2. Microspecimens to be collected by Diagnostic Techs.
   Invert to mix anticoagulant with specimen.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: **Stat:** 1 hour; **Routine:** 4 hr.

Interpretation (effective 1-27-2014):

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Manual Diff (male/female): Neut 50 - 75%; Lymph 14 - 40%; Mono 0 - 10%;
Eos 0 - 5%; Baso 0 - 2%; Bands 0 - 5%; Platelets adequate; RBC morphology normal

NOTES:
1. For age-specific reference ranges, refer to the individual patient report.
2. Select abnormal CBC results will be reviewed by a pathologist.

CEA (CARCINOEMBRYONIC ANTIGEN) CHEMISTRY

Order As: CEA
Patient Preparation: None
Specimen Collection, Minimum Amount: 10 ml blood in gel barrier tube.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours (Monday – Friday)
Interpretation: 0.0 - 3.0 ng/ml

CELL COUNT (CSF and Cavity Fluids) HEMATOLOGY

Order As: CSF Cell count
Body Fluid Cell count
Patient Preparation: None
Specimen Collection, Minimum Amount:
    CSF: 1 ml fluid in sterile spinal fluid tube
    Cavity fluid: 1 ml in 5 ml Lavender Top Tube. Invert to mix anticoagulant with specimen.
Stat?: Yes
Weekends/Holidays: Stat: 1 hour; Routine: 4 hours
Interpretation: Normals:
    Cerebrospinal Fluid: 0-5 WBC/mm3
    Cavity Fluids: 0-5 WBC/mm3

CERULOPLASMIN CHEMISTRY

Order As: Ceruloplasmin
Patient Preparation: None
Specimen Collection, Minimum Amount: 4 ml blood in gel barrier tube
    Draw in chilled tube and keep on ice.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (Reference Lab Procedure)
Interpretation: Normal: Male 16.2 – 35.6 mg/dl
    Female 17.9 – 53.3 mg/dl
CH50 - See Complement, Total

---------------------------------------------------------------

CHEM SCREEN - See Comprehensive Metabolic panel (CMP) CHEMISTRY

---------------------------------------------------------------

CHLORIDE CHEMISTRY

Order As: Chloride
Synonym: Cl-
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. 1 ml blood in gel barrier tube.
2. Gold Top Microtainer with serum separator - fill 1/2 full.
Stat?: Yes
Turnaround Time: Stat: 1 hr; Routine: 4 hrs
Interpretation: Normal: 95-108 mEq/L

---------------------------------------------------------------

CHOLESTEROL CHEMISTRY

Order As: Cholesterol
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. 1 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator - fill 1/2 full.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 hrs.
Interpretation: Normal: <200 mg/dl

---------------------------------------------------------------

CHROMOSOME STUDIES - Contact Chemistry Section, ext. 4862 for information on specimen requirements for genetics testing.

---------------------------------------------------------------

CK, TOTAL (CREATININE PHOSPHOKINASE) CHEMISTRY

Order As: CK Total
Synonyms: formerly CPK
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs
Interpretation: Normal: Male: 57-374 U/L
Female: 35-230 U/L

-----------------------

**CK-MB**

**CHEMISTRY**

Order As: CKMB
Patient Preparation: None
Specimen Collection, Minimum Amount: 5 ml blood in gel barrier tube.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal: <8 ng/ml

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**CLOMIPRAMINE (ANAFRANIL)**

**CHEMISTRY**

Order As: Clomipramine
Patient Preparation: None
Specimen Collection, Minimum Amount:
8 ml blood in Red Top Tube without serum separator
NOTE: Collect specimen prior to next dose.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Clomipramine: 70 - 200 ng/ml
Norclomipramine: 150 - 300 ng/ml

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**CMP (Comprehensive Metabolic Panel)**

-See -Comprehensive Metabolic Panel

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**CO2 (CARBON DIOXIDE)**

**CHEMISTRY**

Order As: CO2
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. 1 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator - fill 1/2 full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal: 24 - 32 mEq/L
COCCIDIOIDES ANTIBODY

Order As: Coccidioides Ab
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 - 10 days (Reference Lab Procedure)
Interpretation: Normal: Negative
Note: Any significant rise in titer from acute to convalescent phase serum is diagnostic of infection.

COLD AGGLUTININ

Order As: Cold Agglutinin
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in Red Top Tube.
   NOTE: Must be collected and kept at 37 degrees C (in a cup of warm water).
   DO NOT SEND THESE SPECIMENS THROUGH THE PNEUMATIC TUBE SYSTEM
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hrs.
Interpretation: Negative Titer: <1:32

COMPLEMENT, TOTAL

Order As: Total Complement
Synonyms: CH50, Total hemolytic complement
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in Red Top Tube
   NOTE: Collect and place tube IMMEDIATELY into an ice bath.
   DO NOT SEND THESE SPECIMENS THROUGH THE PNEUMATIC TUBE SYSTEM.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (Reference Lab Procedure)
Interpretation: Normal: 22-60 units/ml

COMPLEMENT C3 ACTIVATOR

Order As: C3 Complement Activator
Patient Preparation: None
Specimen Collection, Minimum Amount: 5 ml blood in gel barrier tube
COMPREHENSIVE METABOLIC PANEL (CMP)  
**CHEMISTRY**

**Order As:** CMP  
**Synonyms:** Chem Screen, Chem 14, SMAC  
**Includes:** See Interpretation listing below  
**Patient Preparation:** Preferable if patient is fasting.  
**Specimen Collection/Minimum amount:** 4 ml blood in gel barrier tube.  
**Stat?: Yes**  
**Weekends/Holidays:** Yes  
**Turnaround Time:** Stat: 1 hour; Routine: 4 hrs.  
**Interpretation:** Normal:  
- A/G ratio: 0.1 - 2.2 (calculation)  
- Albumin: 3.5 - 5.6 gm/dl  
- Alk. Phosphatase: 43 - 122 IU/L  
- ALT: Male: 0-55 IU/L; Female: 0-45 IU/L  
- AST: 10 - 30 IU/L  
- BUN: 5 - 24 mg/dl  
- Bilirubin, total: 0.6 - 1.0 mg/dl  
- Calcium: 8.4 - 10.2 mg/dl  
- Chloride, (CL): 95 - 108 mEq/L  
- CO2: 24 – 32 mEq/L  
- Creatinine*: 0.3 - 1.5 mg/dl  
- Glucose: 68 - 122 mg/dl (fasting)  
- Potassium (K): 3.5 - 5.2 mEq/L  
- Sodium (Na): 134 - 146 mEq/L  
- Total Protein: 6.0 – 8.3 gm/dl  
*Note: GFR: <60 ml/min/1.73 sq.m. may indicate chronic kidney disease.

CORTISOL  
**CHEMISTRY**

**Order As:** Cortisol basal stimulated 30 or stimulated 60 AM or PM (As applicable)  
**Patient Preparation:** Usually drawn at 8AM and 4PM  
**Specimen Collection, Minimum Amount:** 3 ml blood in gel barrier tube  
**NOTE: Label time of collection.**

**Stat?: No**  
**Weekends/Holidays:** Will accept specimen.  
**Turnaround Time:** 24 hours  
**Interpretation:** Normal:  
- 8AM – 5-25 ug/dl  
- 4PM – 2.5-12.5 ug/dl

CORTISOL, FREE - 24 HR. URINE  
**CHEMISTRY**

**Order As:** Cortisol  
**Synonyms:** Cortisol in 24 hr. urine  
**Includes:** See Interpretation listing below  
**Patient Preparation:** Preferable if patient is fasting.  
**Specimen Collection/Minimum amount:** 4 ml blood in gel barrier tube.  
**Stat?: Yes**  
**Weekends/Holidays:** Yes  
**Turnaround Time:** Stat: 1 hour; Routine: 4 hrs.  
**Interpretation:** Normal:  
- 8AM – 5-25 ug/dl  
- 4PM – 2.5-12.5 ug/dl
**Order As:** Cortisol, Free (24 hr urine)
**Patient Preparation:** None
**Specimen Collection, Minimum Amount:** 24 hr. urine collection
**NOTE:** A boric acid tablet must be added to the specimen container prior to collection.
**Stat?:** No
**Weekends/Holidays:** Will accept specimen.
**Turnaround Time:** 5 days. (Reference Lab Procedure)
**Interpretation:** Age-specific reference ranges will be indicated on the report.

---

**C-PEPTIDES**

**CHEMISTRY**

**Order As:** C Peptides
**Patient Preparation:** Fasting 14-16 hours
**Specimen Collection, Minimum Amount:**
4 ml blood in a gel barrier tube and freeze immediately
**Stat?:** No
**Weekends/Holidays:** Will accept specimen.
**Turnaround Time:** 3 days (Reference Lab Procedure)
**Interpretation:** Normal: 1.1 – 4.4 ng/ml

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**C-REACTIVE PROTEIN (CRP)**

**CHEMISTRY**

**Order As:** C-Reactive Protein
**Patient Preparation:** None
**Specimen Collection/ minimum amount:** 2 ml blood in gel barrier tube
**Stat?:** No
**Weekends/Holidays:** Yes
**Turnaround Time:** 8 hours
**Interpretation:** Normal: Less than 0.8 mg/dl

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**CREATININE (Serum)**

**CHEMISTRY**

**Order As:** Creatinine
**Patient Preparation:** None
**Specimen Collection, Minimum Amount:**
1. 1 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator - fill 1/2 full
**Stat?:** Yes
**Weekends/Holidays:** Yes
**Turnaround Time:** Stat: 1 hour; Routine: 4 hrs.
Interpretation: Normal: 0.3 - 1.5 mg/dl
Note: GFR: <60 ml/min/1.73 sq.m. may indicate chronic kidney disease.

CREATININE (Urine) CHEMISTRY

Order as: Creatinine Urine
Patient Preparation: None.
Specimen Collection, Minimum Amount: 24 hr. urine collection
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: male: 1000-2000 mg/24 hr
Female: 600-1500 mg/24 hr

CREATININE CLEARANCE CHEMISTRY

Order As: Creatinine Clearance
Patient Preparation: Patient should drink as much water as possible during test.
This test requires:
(1) A timed urine collection (2 hours up to 24 hours, to be determined by physician’s order), and
(2) a blood creatinine within 24 hours of urine collection.

Urine Collection procedure:
1. Obtain a 24 hour urine jug from the Storeroom and label it with the patient’s name and second identifier (MR#, DOB). No urine preservative is required.
2. At the beginning of specified time period, have the patient void to empty his/her bladder. 
   DISCARD THIS SPECIMEN.
3. All urine voided after this initial specimen and for the duration of the test must be collected, including the sample at the end of the timed period.
   NOTE: Keep the specimen refrigerated during the collection period. Specimens may be pooled.
4. Send the labeled specimen(s) to the Laboratory. 24 hour urine jugs cannot be sent through the pneumatic tube system.
5. It is the responsibility of the nursing unit to ensure that a serum creatinine has been performed on the patient.
Minimum Amount:
1. 2 hour timed urine specimen.
2. 3 ml in a gel barrier tube for serum creatinine.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hrs.
Interpretation: Normal: 97-137 ml/min.
CROSSMATCH

Order As: Ordering Packed Red Blood Cells
Patient Preparation: None
Specimen Collection:
Purple-top tube. Label with (1) patient’s full name and Medical Record number or Trauma number exactly as it appears on the Identaband, (2) date of collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.

Minimum Amount: Adult: 7 ml blood in a 10 ml purple-top tube
Infant: Pediatric purple-top tube

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 45 min.; Routine: Same day
Interpretation: Compatible or Incompatible

CRYOGLOBULIN

Order As: Cryoglobulin
Patient Preparation: None
Specimen Collection, Minimum Amount: 5 ml blood in Red Top Tube.

NOTE: Tube must be collected and kept at 37°C (body temp) in a cup of warm water.

DO NOT SEND THESE SPECIMENS THROUGH THE PNEUMATIC TUBE SYSTEM

Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days
Interpretation: Normal: Negative
If positive, quantitation and identification will be performed and reported.

CRYOPRECIPITATE

Order As: Ordering Blood Components for Administration
Patient Preparation: None
Specimen Collection:
None, if patient has been previously grouped and typed on the same admission.
If not: Purple-top tube (blood). Label with (1) patient’s full name and Medical Record number or Trauma number exactly as it appears on the Identaband, (2) date of collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to...
obscure the blank tube label beneath.

**IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.**

Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Dependent upon availability of material from supplier. Takes an additional 30 minutes to thaw and pool once it is received in house.  
Interpretation: N/A

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**CRYPTOCOCCAL ANTIGEN (CSF OR BLOOD) - MICROBIOLOGY**

Order As: Cryptococcal Antigen  
Includes: If positive, a titer is automatically performed  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
1. Cerebrospinal fluid - 1 ml  
2. Blood - 4 ml in gel barrier tube  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: 1 hour  
Interpretation: Normal: Negative.  
**Note:** This test is recommended for immunocompromised patients if cryptococcal infection is suspected.

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**CRYPTOSPORIDIUM - See Microbiology Section J, p.49**

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**CULTURE, GENERAL - See Microbiology Section B, p.36**

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**CYCLOSPORINE - CHEMISTRY**

Order As: Cyclosporine  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
4 ml blood in **LAVENDER** Top Tube. **Invert** to mix specimen with anticoagulant.  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hours  
Interpretation: Therapeutic range: 150 - 250 ng/ml (depends on chemotherapy dose)

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DARVON

Order As: Darvon Level
Synonym: Propoxyphine
Patient Preparation: Collect prior to next dose
Specimen Collection, Minimum Amount: 4 ml blood in Red Top Tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 10 days
Interpretation: Therapeutic: 100 - 400 mg/ml; Toxic: >500 mg/ml

D-DIMER

Order as: D-Dimer
Patient Preparation: None
Specimen Collection, Minimum amount: EXACTLY 2.7 ml blood in 5 ml Blue Top Tube
Note: Invert to mix anticoagulant with specimen.
Stat? Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normal: < 0.5 FEU

DEMEROL

Order As: Demerol - Meperidine (serum)
Synonym: Meperidine
Patient Preparation: Collect immediately prior to next dose
Specimen Collection, Minimum Amount: 4 ml blood in Red Top Tube without serum separator.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Therapeutic: 70 - 500 ng/ml; Potentially toxic: > 1000 ng/ml

DEPAKENE – See VALPROIC ACID
Order As: Desipramine
Synonyms: Norpramin, Pertofrane
Patient Preparation: None
Specimen Collection: 10 ml blood in Red top tube without serum separator.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 days (reference lab procedure)
Interpretation: Therapeutic: 100 - 300 ng/ml; Potentially toxic: > 300 ng/ml

DHEA

Order as: DHEA
Synonym: Dehydroepiandrosterone
Patient preparation: No isotopes administered 24 hours prior to venipuncture
Specimen collection/minimum amount: 3 ml blood in gel barrier tube
Stat? No
Weekend/holidays: Will accept specimen
Turnaround time: 6 days (Reference Lab procedure)
Interpretation: Age specific. Will specify on report.

DHEA-S

Order as: DHEA-S
Synonym: Dehydroepiandrosterone sulfate
Patient preparation: None
Specimen collection/minimum amount: 3 ml blood in gel barrier tube
Stat? No
Weekend/holidays: Will accept specimen
Turnaround time: 3-5 days (Reference lab procedure)
Interpretation: Age specific. Will specify on report.

DIAZEPAM

Order As: Diazepam
Synonym: Valium, Benzodiazepine, Nordiazepam
Patient Preparation: none
Specimen Collection:
1) draw 1 hour after oral dose
2) 15 minutes after IV dose
Minimum Amount: 5 ml blood in a red-top tube without serum separator
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 days (reference lab procedure)
Interpretation: Therapeutic: 0.2 – 0.8 mcg/ml; Toxic: > 5.0 mcg/ml
**DIGOXIN**

**CHEMISTRY**

Order As: Digoxin level
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in gel barrier tube

*Specimen must be drawn at least 4 hrs. after last dose.*

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 8 hrs.
Interpretation: Therapeutic: 0.5 - 2.0 ng/ml; Toxic: >2 ng/ml

**DILANTIN**

**CHEMISTRY**

Order As: Phenytoin
Synonym: Phenytoin
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in red top tube without gel barrier.

*Specimen must be drawn at least 2-3 hours after last dose.*

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr; Routine: 1 day
Interpretation: Therapeutic range: 10-20 mcg/ml

**DILANTIN, FREE**

**CHEMISTRY**

Order As: Free Phenytoin
Patient Preparation: Draw prior to next dose
Specimen Collection, Minimum Amount: 8 ml blood in Red Top Tube without serum separator
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 days (Reference Lab)
Interpretation: Therapeutic: 1.0 – 2.0 mcg/ml; Toxic: >2.5 mcg/ml

**DILUTE RUSSELL VIPER VENOM (DRVVT)**

**HEMATOLOGY**

Order as: DRVVT
Includes: LA Screen and LA Confirmatory
Patient Preparation: None
Specimen Collection, Minimum Amount:
EXACTLY: 2.7 ml blood in 3 ml Blue top tube
Note: Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 hours
Interpretation: Normal: LA Screen: Negative; LA Confirmatory: Less than 1.20

DIPHTHERIA ANTIBODY

MICROBIOLOGY

Order As: Diphtheria Antibody
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 days (Reference Lab Procedure)
Interpretation: Normal: See Reference report

DIRECT ANTIGLOBULIN TEST (DIRECT COOMBS)

BLOOD BANK

Order As: Coombs test (Direct)
Patient Preparation: None
Specimen Collection/minimum amount:
Adult: 3 ml blood in a purple-top tube (invert to mix anticoagulant)
Infant: 0.5 ml blood in a pediatric purple-top tube (invert to mix anticoagulant)
Label with (1) patient’s full name and medical record number or trauma number exactly as it appears on the Identaband, (2) date of collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.
IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Routine: 1 day; Stat: 20 min
Interpretation: Normal: Negative.
If positive C3d. If positive, no further tests.
IgG. If positive, will do acid elution. Based on I.D., antigen typing will be performed.

DNA ELISA

HEMATOLOGY

Order As: DNA ELISA
Synonym: Anti-ds DNA, Anti-native DNA
Patient Preparation: None
Specimen Collection, Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Batched, run once per week.
Interpretation: Normal: 0 - 200 IU/ml

DOXEPIN

Order As: Doxepin
Synonym: Sinequon
Patient Preparation: None
Specimen Collection: Minimum Amount: 5 ml blood in a red top tube without serum separator
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Therapeutic: 150-250 ng/ml; Toxic: Greater than 500 ng/ml

DRUG SCREEN, URINE

Order as: Drug Screen, random urine
Includes: Amphetamines, barbiturates, benzodiazepine, cocaine, THC, methadone, opiates, PCP.
Patient Preparation: None
Specimen collection, minimum amount:
20 ml urine (Refrigerate specimen if not delivered to lab immediately).
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 2 hours; Routine: Day shift only
Interpretation: Normal: Negative
NOTE 1: All positive specimens are retained for 7 days; if confirmation is desired, contact the Chemistry Section, X 4862.
NOTE 2: This is NOT chain-of-custody.

D-XYLOSE

Order As: D-Xylose
Patient Preparation:
Schedule at least 24 hours prior to test with Chemistry Section (x 4862). Patient must be fasting. The patient is given the test drink by the Diagnostic technician at 7AM.
The patient must fast until completion of test (5 hours).
Specimen Collection/minimum amount:
  All urine from 7 AM – 12 noon
  Blood specimen: 1 full **GRAY** Top Tube, drawn at 9AM
Stat?: No
Weekends/Holidays: No
Turnaround Time: 3 days (reference lab)
Interpretation: Blood: 32 - 58 mg/dl; Urine: > 4.0 gm/5 hrs

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**ELAVIL (AMITRIPTYLINE)**

Order As: Elavil (amitriptyline)
Patient Preparation: Collect immediately prior to next dose
Specimen Collection, Minimum Amount:
  10 ml blood in Red Top Tube **without serum separator**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days
Interpretation: Normal: 120-250 mg/ml

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**ELECTROLYTE PANEL**

Order as: Electrolytes
Includes: CO₂, Chloride, Sodium, Potassium
Patient Preparation: None
Specimen Collection/minimum amount: 3 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Routine: 4 hours  Stat: 1 hour
Interpretation:
  CO₂  24-32 mEq/L ;  Cl  95-108 mEq/L;  Sodium  134-146 mEq/L;
  Potassium  3.5-5.2 mEq/L

---

**EOSINOPHIL COUNT**

Order As: Eosinophil count
Patient Preparation: None
Specimen Collection/minimum amount:
  1 ml blood in 5 ml Lavender Top Tube (Hemogard tube)
  **Invert** to mix anticoagulant with specimen.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 4 hrs.
Interpretation: Normal: 50-440/mm3
EOSINOPHIL SMEAR (NASAL, STOOL AND URINE)  HEMATOLOGY

FIND: STOOL - HEMATOLOGY SCREEN
NASAL and URINE - HEMATOLOGY ALPHA-BROWSE

Order As: Eosinophil Smear
Patient Preparation: None
Specimen Collection:
1. Glass slide(s) prepared from nasal swab labeled with patient's name. Be sure to keep slides separated in transport to prevent specimen from being wiped off onto the back of the other slide.
2. Urine or stool specimen sent to Lab.
Minimum Amount: 1-2 slides - nasal
Stat?: No
Weekends/Holidays: No
Turnaround Time: 4 hrs.
Interpretation: Normal: No eos seen.

ERYTHROPOIETIN  CHEMISTRY

Order as: EPO
Patient preparation: None
Specimen collection/minimum amount: 5 ml blood in gel barrier tube
Stat? No
Weekend/holidays: Will accept specimen
Turnaround time: 3 days (Reference Lab procedure)
Interpretation: Adult: 2.6 – 18.5 mIU/ml
Pediatric: reference evaluation will appear with test result

ESR  -  See SEDIMENTATION RATE

ESTERASE STAIN  HEMATOLOGY

Order As: Esterase A-naphthyl acetate
Patient Preparation: None
Specimen Collection/minimum amount:
1. 1 ml blood in 5 ml Lavender Top Tube (Hemogard tube).
   Invert to mix anticoagulant with specimen.
2. 2-4 Bone marrow smears or peripheral smears.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 8 hrs. (Day shift only)
Interpretation: Used to differentiate acute myelogenous leukemia from acute myelomonocytic leukemia. Interpretation by Pathologist.
**ESTRADIOL, SERUM (E2) CHEMISTRY**

Order As: Estradiol, Serum  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 4 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hours (run 7 days/week, day shift)  
Interpretation: **All results are reported in pg/ml**

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<th>Adult</th>
<th>Female: Prepuberty</th>
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**ESTRIOL, SERUM CHEMISTRY**

Order As: Estriol Serum  
Patient Preparation: None. Please indicate gestational weeks if pertinent.  
Specimen Collection, Minimum Amount: 3 ml blood in gel barrier tube  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 3 days (Reference Lab Procedure)  
Interpretation: Male and non-pregnant female - 0.2 ng/ml  
               Pregnancy - See report form.

**ESTROGENS, TOTAL CHEMISTRY**

Order As: Estrogen  
Patient Preparation: No radioisotopes  
Specimen Collection, Minimum Amount: 8 ml blood in gel barrier tube  
Weekends/Holidays: Will Accept specimen.  
Turnaround Time: 4 days (reference lab procedure)  
Interpretation: Normal: See report

**ETHANOL – See ALCOHOL, SERUM OR URINE**
EUGLOBULIN CLOT LYSIS

Order as: Euglobulin Clot lysis
Patient Preparation: None
Specimen collection: minimum amount:
   **EXACTLY:** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   Invert to mix anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround time: 48 hours
Interpretation: Lysis in 2-10 hours

FACTOR ASSAYS

Order As: Factor II, Factor V, Factor VII, Factor VIII, Factor IX, Factor X, Factor XI, Factor XII (as applicable)
Patient Preparation: No anticoagulation therapy should have been administered.
Specimen Collection/Minimum amount:
   **EXACTLY:** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   **Invert to mix anticoagulant and bring to Lab immediately.**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 8 hrs
Interpretation: Normals:

Factor II: 73-138%  Factor VIII: 60-150%  Factor XI: 60-150%
Factor V: 70-145%  Factor IX: 60-150%  Factor XII: 60-150%
Factor VII: 66-159%  Factor X: 61-146%

FACTOR II (PROTHROMBIN) by PCR - performed as part of the Molecular Coagulation Panel in Microbiology.

FACTOR V LEIDEN by PCR – performed as part of the Molecular Coagulation Panel in Microbiology.

FACTOR VIII (8) CONCENTRATE

Order As: Ordering Blood Components for Administration KOATE
Patient Preparation: None
Specimen Collection: None
Minimum Amount: N/A
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Dependent upon availability of material from supplier
Interpretation: N/A

FACTOR VIII INHIBITOR

Order As: Factor VIII Coag. Inhib.
Patient Preparation: None
Specimen Collection, Minimum Amount:
Collect two (2) – 5ml Blue Top Tubes (Hemogard plastic), each with EXACTLY 2.7 ml blood
NOTE: Draw other tests first or draw 1/2 tube of blood and discard. Tube must be full.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days
Interpretation: Normal: No inhibitor

FACTOR IX INHIBITOR

Order: on Miscellaneous Lab slip
Synonym: FIX Inhibitor (Bethesda)
Patient Preparation: None
Specimen collection/minimum amount:
Collect four (4) - 5ml Blue top tubes (Hemogard plastic), each with exactly 2.7 ml blood.
Stat? No
Weekends/holidays: Will accept specimen
Turnaround Time: 1 week (Reference Lab procedure)
Interpretation: 0 - 0.8 Bethesda units

FACTOR Xa

Order as: Factor Xa
Synonyms: Low Molecular Weight Heparin (LMWH)
Patient Preparation: None
Specimen Collection/Minimum amount:
EXACTLY: 2.7 ml blood in a 5 ml Blue top tube (Hemogard plastic)
NOTE: Invert to mix specimen with anticoagulant.
Stat: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 hours
Interpretation:
  High Dose Therapy: 1 mg/kg/12 hrs = 100 anti-Xa IU/Kg/24 hrs
  2 injections/day, 3 hr after injection: 0.5-1.2 anti-Xa IU/ml
  Low Dose Therapy(1 inj/day: 20 mg moderate risk; 40 mg high risk)
Subcutaneous: 20 mg (mod. risk) - 0.20 Anti-Xa IU/ml
40 mg (high risk) – 0.40 anti-Xa IU/ml

**FACTOR XI INHIBITOR**

**HEMATOLOGY**

Order: on Miscellaneous Lab Slip
Synonym: FXI inhibitor (Bethesda)
Specimen collection/minimum amount:
Patient preparation: none
Collect four (4) – 5 ml Blue top tubes (Hemogard plastic), each with exactly 2.7 ml blood.
Stat? No
Weekends/holidays: Will accept specimen
Turnaround time: 1 week (Reference Lab procedure)
Interpretation: Normal: 0 – 0.8 Bethesda units

**FACTOR XIII**

**HEMATOLOGY**

Order as: FXIII
Patient Preparation: None
Specimen Collection, minimum amount:
**EXACTLY**: 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hours
Interpretation: Normal: FXIII detected

**FAT, QUALITATIVE (URINE OR FECES)**

**CHEMISTRY**

Order As: Fat qualitative (urine) or Fecal Fat qualitative, as applicable
Patient Preparation: None
Specimen Collection, Minimum Amount:
1. Random urine - 10 ml
2. Random stool
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 Hr
Interpretation: Normals: Random urine: Negative
Random stool: up to 60 droplets/HPF

**FAT, QUANTITATIVE (FECAL)**

**CHEMISTRY**

Order As: Fecal Fat Quantitative
Patient Preparation: None
Specimen Collection: All fecal samples for 72 hrs in container provided by laboratory.
Minimum Amount: N/A Stat?: No
Weekends/Holidays: Accepted - yes; tested - no.
Turnaround Time: 1 week (Reference Lab Procedure)
Interpretation: Normal: 0 - 6 years: 0.0 - 2.0 gm/24 hr
6 years - Adult: 0.0 - 7.0 gm/24 hr.

FEP (Free Erythrocyte Protoporphyrin) CHEMISTRY
Order As: Miscellaneous - FEP
Synonym: FEP, ZPP
Includes: Zinc protoporphyrins and free erythrocyte protoporphyrins
Patient Preparation: None
Specimen Collection/minimum Amount:
    Royal blue EDTA lead-free
    **Invert to mix anticoagulant with specimen.**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (Reference Lab Procedure)
Interpretation: Normal: FEP: 0-34 ug/dl; ZPP: 0-38 ug/dl

FERRITIN CHEMISTRY
Order As: Ferritin
Patient Preparation: None
Specimen Collection/minimum Amount: 1 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours
Interpretation: Normal: Female: 9 - 120 ng/ml; Male: 18 - 370 ng/ml

FETAL CELL SCREENING BLOOD BANK
Order As: Fetal Cell Screen
Patient Preparation: None
Specimen Collection/minimum Amount: 5 ml blood in purple-top tube
Stat? No
Weekends/Holidays: Yes
Turnaround Time: Same day
Interpretation: Normal: Negative.

FETAL FIBRONECTIN (fFN) CHEMISTRY
Order as: Fetal Fibronectin
Patient preparation: Symptomatic pregnant women between 24 and 34 weeks, 6 day gestation and asymptomatic pregnant women between 22 and 30 weeks, 6 days gestation. Specimen collection: vaginal specimen obtained using Adeza Biomedical Specimen collection kit.
Stat? Yes
Weekend/Holidays: Yes
Turnaround Time: Stat 90 min; Routine 4 hours
Interpretation: Negative

FETAL HEMOGLOBIN (SCREEN) - See ABT TEST

FIBRINOGEN

Order As: Fibrinogen
Patient Preparation: None
Specimen Collection/minimum Amount:
   - Exactly 2.7 ml blood in a 5 ml Blue Top tube (hemogard plastic)
   - Invert to mix specimen with anticoagulant.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr; Routine: 4 hrs.
Interpretation: Normal: 198 - 427 mg/dl

FIBRINOGEN ANTIGEN

Order as: Fibrinogen antigen on a miscellaneous slip
Patient preparation: None
Specimen collection/minimum amount:
   - Exactly 2.7 ml blood in a 5 ml Blue Top tube (hemogard plastic)
   - Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 48 hrs.
Interpretation: Normal: 180 - 400 mg/dl

FK506 - See TACROLIMUS

FLUORESCENT TREPONEMAL ANTIBODY - See FTA
FOLATE, SERUM (FOLIC ACID)  
CHEMISTRY

Order As: Folate (serum)  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 4 ml blood in gel barrier tube.

Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: Routine: 4 hours – **DAY SHIFT ONLY**  
Interpretation: Normal: Greater than 2.8 ng/ml

FOLLICLE STIMULATING HORMONE, SERUM  
CHEMISTRY

See FSH, SERUM

FREE ERYTHROCYTE PROTOPORPHYRIN - See FEP

FRESH FROZEN PLASMA  
BLOOD BANK

Order As: Ordering Blood Components for Administration/ Fresh Frozen Plasma  
Patient Preparation: None  
Specimen Collection/minimum amount:  
  Adult: 10 ml blood in purple-top tube.  
  Infant: 0.5 ml blood in pediatric purple-top tube  
Label with:  
  (1) patient’s full name and Medical Record number, or Trauma number exactly as it appears on the Identaband, (2) date of collection also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

  **IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.**

Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: 45 min. to thaw immediately prior to transfusion.  
Interpretation: N/A

FSH (Follicle Stimulating Hormone), Serum  
CHEMISTRY
Order As: FSH
Patient Preparation: None
Specimen Collection, Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes (run 7 days/week, day shift)
Turnaround Time: 24 hours
Interpretation:
  Adult male: 1.0 – 8.0 MIU/ml
  Adult female:
    Follicular 4.0 – 13.0 MIU/ml
    Mid-cycle 5.0 – 22.0 MIU/ml
    Luteal 2.0 – 13.0 MIU/ml
    Post-menopausal 20.0 – 138.0 MIU/ml

FTA (SERUM or CSF) CHEMISTRY

Order As: FTA/ABS (serum) or FTA/ABS (CSF), as applicable
Synonym: Fluorescent Treponemal Antibody
Patient Preparation: None
Specimen Collection, Minimum Amount:
  1. 2 ml blood in gel barrier tube
  2. 1 ml CSF
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24-48 hours (Reference Lab Procedure)
Interpretation: Normal: Negative (Non-reactive).

FTI (FREE THYROXINE INDEX) CHEMISTRY

Order as: Miscellaneous - FTI (Must also order T3 uptake and T4 total)
Patient Preparation: None
Specimen Collection, Minimum Amount:
The FTI is a calculation derived from T3 uptake and Total T4. It must be ordered in conjunction with these 2 tests, which together require 2 ml blood in gel barrier tube.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 1.0 – 5.0
### FUNGAL SMEAR - (KOH, INDIA INK) - See Microbiology Section F

### FUNGI CULTURE - See Microbiology Section E

### GC CULTURE - See Microbiology Section B

### GENTAMICIN LEVEL

**CHEMISTRY**

Order As: Gentamicin Peak, trough or random as applicable.
Patient Preparation: Patient must have received the aminoglycoside listed.
Specimen Collection/Minimum amount: 3 ml blood in Red Top Tube

1. **Peak Level**
   a) Drug given I.M.: Blood drawn 1 hr after injection
   b) Drug given I.V: Blood drawn at the end of infusion

2. **Trough Level** - Blood drawn just prior to administration of next dosage of gentamicin.

**NOTE:** Patient should have been on the aminoglycoside for 24 hours before a trough level is drawn.
Stat?: Yes (Nursery only)
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 1 day
Interpretation: Therapeutic Gentamicin serum levels:
   - Random: 1.0 – 10.0 ug/ml
   - Peak: 5-10 ug/ml
   - Trough: <2 ug/ml (adult)
   - <1 ug/ml (neonates)

### GGTP (GAMMA GLUTAMYL TRANSPEPTIDASE)

**CHEMISTRY**

Order As: GGTP
Patient Preparation: None
Specimen Collection, Minimum Amount: 4 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 4 hrs
Interpretation: Normal - Male: 15-85 U/L; Female: 5-55 U/L

### GI PATHOGEN PANEL BY PCR

**MICROBIOLOGY**

Order as: GI Pathogen Panel By PCR
Synonym: GIPP
Patient Preparation: None
Specimen Collection/Minimum Amount: Loose, watery diarrhea stool in Cary Blair preservative (orange vial)
Formed stools will be rejected.

Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 Hours
Interpretation: Normal = Negative for all Analytes

GLUCOSE, BODY FLUID or CSF

Order As: Glucose Body Fluid or Glucose CSF as applicable
Patient Preparation: None
Specimen Collection, Minimum Amount: 1) 0.5 ml CSF
2) 0.5 ml cavity fluid

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 4 hrs.
Interpretation: Normal:
1) CSF glucose is 2/3 - 3/4 of blood glucose drawn at the same time.
2) Synovial fluid glucose is the same as blood glucose drawn at the same time.
3) Glucose normal value for other body fluids varies with source of specimen.

GLUCOSE, (SERUM)

Order As: Glucose Fasting or Glucose random, as applicable
Patient Preparation: Random - None
Fasting - NPO from midnight to test
Specimen Collection, Minimum Amount:
1. 2 ml blood in gel barrier tube
2. Red Top Microtainer with serum separator - fill 1/2 full.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr; Routine: 4 hrs.
Interpretation: Normal: 70–99 mg/dl (fasting)
70 – 140 mg/dl (non-fasting and diabetic)

GLUCOSE, 2 HR. POST PRANDIAL (2 HR PP)

Order As: Glucose 2 hr Post Prandial (PP)
Patient Preparation:
1. NPO from midnight until test
2. Unless otherwise indicated, a glucose solution is given at approximately 6AM
3. The glucose solution is obtained from the/Diagnostic Technician Service prior to the test.

4. The Diagnostic technician will draw a blood sugar exactly 2 hrs later (Blood may also be drawn 2 hrs. after a meal - dependent on physician’s orders).

Specimen Collection/minimum amount:

1. 2 ml blood in gel barrier tube
2. Gold Top Microtainer with serum separator - Fill to the clear-banded area of the Microtainer tube.

Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 hrs.
Interpretation: 70-99 mg/dl

---

**GLUCOSE, QUANTITATIVE (URINE)**

**URINALYSIS**

Order As: Glucose-Quant (24 hr urine)
Patient Preparation: None
Specimen Collection/Minimum Amount: 24 hr. urine collection.

**NOTE:** Boric acid or Sodium fluoride must be added to the specimen container prior to collection.

Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hrs.
Interpretation: Normal: 0 - 500 mg/24 hr.

---

**GLUCOSE TOLERANCE**

**CHEMISTRY**

Order As: Glucose Tolerance Test 1 hr or 3 hrs as applicable
Includes: Serum glucose levels for each specimen

**NOTE:** THIS TEST IS NOT INDICATED IF PATIENT IS ACUTELY ILL.

1. Must be scheduled with Diagnostic Technicians (x4829). Give patient’s height and weight.
2. Patient should ingest at least 150 gm. of carbohydrates per day for 3 days preceding test.
3. Discontinue for 3 days preceding test all drugs proven or believed to influence glucose tolerance including hormones, oral contraceptives and hypoglycemic agents.
4. No food intake for 8 hrs. prior to test. Water ad lib.

Specimen Collection:

1. The Diagnostic Technician will collect a fasting blood specimen and administer an oral glucose beverage.
2. Blood samples will be collected by the Diagnostic Tech at hourly intervals up to 3 hrs. as per M.D.’s orders.
Minimum Amount: (each hour)
2 ml blood in gel barrier tube, OR
Gold Top Microtainer with serum separator - fill 1/2 full

Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hrs.
Interpretation: Normals: Fasting: 70-99 mg/dl
1 hour (peak): <185 mg/dl
1-1/2 hours: <160 mg/dl
2 hours: <140 mg/dl

At least 2 of these figures must be abnormal for the diagnosis of diabetes mellitus. If a single value is abnormal, it should be considered suspicious.

G-6-PD (GLUCOSE-6-PHOSPHATE DEHYDROGENASE ) CHEMISTRY

Order As: G6PD
Includes: RBC count
Patient Preparation: None
Specimen Collection, Minimum Amount:
2 Lavender top tubes (revised 2/04/14)
Invert to mix anticoagulant with specimen
Stat?: No
Weekends/Holidays: No
Turnaround Time: 3 days (Reference Lab Procedure)
Interpretation: Normal: 8.8 – 13.4 U/g Hgb

GROUP AND TYPE (ABO/RH) BLOOD BANK

Order As: ABO/RH Newborn, ABO/RH Obstetrics, or ABO/RH Type, as applicable
Patient Preparation: None
Specimen Collection:
Purple-top tube. Label with (1) patient’s full name and Medical record number or Trauma number exactly as it appears on the Identaband,(2) date of collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.
Minimum Amount:  
Adult: 5 ml blood in a purple-top tube
Infant: 0.5 ml blood in a pediatric purple-top tube

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Routine: 4 hrs. Stat: 15 min. (if Rh-Neg:; 35 min)
Interpretation: N/A

GROWTH HORMONE

Order As: Human Growth Hormone
Synonyms: HGH; Human Growth Hormone; Somatotropin; STH
Patient Preparation: Fasting and at complete rest for 30 minutes prior to specimen collection.
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3-5 days. (Reference Lab Procedure)
Interpretation: Normal: Male: 0.01 – 0.97 ng/ml; Female: 0.01 – 3.61 ng/ml

HAEMOPHILUS INFLUENZA ANTIBODY

Order As: Haemophilus Ab
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekend/Holidays: Will accept specimen.
Turnaround Time: 7 days (reference lab procedure)
Interpretation: See report.

HAPTOGLOBIN

Order As: Haptoglobin
Patient Preparation: None
Specimen Collection, Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: No
Turnaround Time: Daily Mon - Fri
Interpretation: Normal: 33-171 mg/dl
HDL (HIGH DENSITY LIPOPROTEIN LEVEL)  CHEMISTRY

Order As: HDL or as part of the Lipid Profile (cholesterol, triglycerides, HDL, calculated LDL)
Patient Preparation: None
Specimen Collection, Minimum Amount: 8 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 35 – 150 mg/dl

HEAVY METALS (URINE)  CHEMISTRY

Order As: Heavy Metals (urine)
Includes: Arsenic, lead, mercury, creatinine
Patient Preparation: None
Specimen Collection: 60 ml random urine or 24 hr urine
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Normal: See report

HELICOBACTER PYLORI ANTIGEN, Fecal by EIA
HELICOBACTER PYLORI BREATH TEST, ADULT*
HELICOBACTER PYLORI BREATH TEST, ADULT*
*Please contact the Laboratory at 551-996-4862 if you would like to discuss ordering this test
Performed by Reference Laboratory

HEMATOCRIT  HEMATOLOGY

Can be ordered individually or as part of a CBC; same protocol at CBC

HEMOGLOBIN  HEMATOLOGY

Can be ordered individually or as part of a CBC; same protocol as CBC

HEMOGLOBIN A1C  CHEMISTRY

Order as: Hemoglobin A1C
Patient Preparation: None
Specimen Collection, Minimum Amount: 1 Lavender Top Tube (blood)
Invert to mix anticoagulant with specimen.

Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 hours
Interpretation: Normal Adult: 4.1 - 5.5%

------------------------------------------

HEMOGLOBIN A2 QUANTITATIVE

HEMATOLOGY

Order As: Hgb A2 Quantitative
Patient Preparation: None
Specimen Collection/ minimum amount:
  1 ml blood in 5 ml Lavender Top Tube (Hemogard tube).
  Micro specimens: 400 lambda blood in Lavender microtainer.

Invert to mix specimen with anticoagulant.

Stat?: No
Weekends/Holidays: No
Turnaround Time: Test performed twice per week (Wed. & Fri)
Interpretation: Normal: A2: 0.1 - 3.8%

------------------------------------------

HEMOGLOBIN ELECTROPHORESIS

HEMATOLOGY

Order As: HGB Electrophoresis
Includes: Alkaline electrophoresis and CBC. Based upon the results of this test, the pathologist may request that the following procedures be performed: Acid Electrophoresis, Quantitative Hgb A2, Kleihauer-Betke, Sickle Cell Screen.
Patient preparation: None
Specimen Collection/minimum amount:
  3 ml blood in 5 ml Lavender Top Tube (Hemogard tube).
  Micro specimens: 2 – 400 lambda blood in Lavender microtainers.

Invert to mix specimen with anticoagulant.

Stat?: No
Weekends/Holidays: No
Turnaround Time: Test performed in Lab on Wednesday
Interpretation: Pathologist interpretive report will be issued.

------------------------------------------

HEPARIN ASSAY (UNFRACTIONATED)

HEMATOLOGY

Order as: Heparin Assay
Patient Preparation: None
Specimen collection/minimum amount:
  EXACTLY: 2.7 ml blood in 5 ml Blue Top Tube (Hemogard plastic)

Invert to mix specimen with anticoagulant.

Stat?: No
Weekends/holidays: Will accept specimen.
Turnaround time: 24 hours
Interpretation:

**High Dose Therapy (400-800 IU/Kg/24 hrs)**

<table>
<thead>
<tr>
<th>Heparin Administration by</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Perfusion</td>
<td>0.40-0.60 IU/ml</td>
</tr>
<tr>
<td>- Intermittent intravenous</td>
<td>0.15-0.30 IU/ml</td>
</tr>
<tr>
<td>(1 hr before next injection)</td>
<td>0.15-0.30 IU/ml</td>
</tr>
<tr>
<td>- Subcutaneous (2-3 inj/day)</td>
<td>0.40-0.60 IU/ml</td>
</tr>
<tr>
<td>(1 hr before injection)</td>
<td>0.15-0.30 IU/ml</td>
</tr>
<tr>
<td>Between 2 inj.(peak level)</td>
<td>0.40-0.60 IU/ml</td>
</tr>
</tbody>
</table>

**Low Dose Therapy (subcutaneous 2-3 inj/day, 200 IU/Kg/24 hr)**

- 1 hr before next injection: < 0.1 IU/ml
- Between 2 injections: 0.10-0.15 IU/ml

---

**HEPARIN INDUCED PLATELET ANTIBODY**

**HEMATOLOGY**

Order: HIPA
Synonym: HIT, HAT, HITA, HIPA
Patient Preparation: None
Specimen collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/holidays: Will accept specimen
Turnaround time: Batched test – 2 times per week
Interpretation: Normal: negative

---

**HEPATIC FUNCTION PANEL**

**CHEMISTRY**

Order as: Hepatic Function Panel
Includes: Albumin, total bilirubin, direct bilirubin, alkaline phosphatase, ALT, AST, total protein
Patient preparation: None
Specimen Collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Interpretation: Normals:

- Albumin 3.5-5.6 g/dl
- Bilirubin, total 0.6-1.0 mg/dl
- Bilirubin, direct 0-0.4 mg/dl
- Alk phos 43-122 IU/L
- ALT Female 0-45 IU/L
  Male 0-55 IU/L
- AST 10-30 IU/L
- Total Protein 6.0 – 8.3 gm/dl
HEPATITIS A CHEMISTRY

Order As: Hepatitis A Total
Patient Preparation: None
Specimen Collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Monday – Friday 24 hrs.
Interpretation: Normal: Non-reactive

HEPATITIS A IgM CHEMISTRY

Order as: HEP A IgM
Patient Preparation: None
Specimen Collection/minimum amount: 4 ml blood in gel barrier tube
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: Monday – Friday 24 hours
Interpretation: Normal Hep A IgM – Negative

NOTE: Testing of persons with no clinical symptoms of acute viral hepatitis, and among populations with a low prevalence of acute HAV infection, lowers the predictive value of the IgM anti-HAV test. Diagnostic tests for viral hepatitis, including licensed IgM anti-HAV tests, are highly sensitive and specific when used on specimens from persons with acute hepatitis. However, their use among persons without symptoms of hepatitis A can lead to IgM anti-HAV test results that are false positive for acute HAV infection.

HEPATITIS ACUTE PANEL CHEMISTRY

Order as: Hepatitis Acute Panel
Includes: Hepatitis A IgM, Hepatitis B Surface Antigen (HBsAg), Hepatitis C (HCV), Hepatitis B core IgM
Patient Prep: None
Specimen Collection/Minimum amount: 1 full gel barrier tube
Turnaround Time: 24 hours Monday - Friday
Interpretation: Normal: Non-reactive

NOTE: A positive HCV antibody will automatically be referred for confirmation by RIBA (immunoblot assay). A positive HBsAg will be confirmed by a second methodology.
HEPATITIS B CORE ANTIBODY (HBcAb) CHEMISTRY

Order as: Hepatitis B Core Ab
Patient Preparation: None
Specimen collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround time: 24 hours Monday - Friday.
Interpretation: Normal: Non-reactive

HEPATITIS B SURFACE ANTIBODY (HBsAb) CHEMISTRY

Order As: Hepatitis B Surface Antibody
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours
Interpretation: Normal: Non-reactive

HEPATITIS B SURFACE ANTIGEN (HBsAg) CHEMISTRY

Order As: Hepatitis B Surface Antigen
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: Stat ONLY for females in labor with no pre-natal work-up. Chemistry must be notified at ext. 4862 for the stat priority to be recognized.
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours Monday - Friday
Interpretation:
  Normal: Non-reactive
  Positive specimens are confirmed by a second methodology.

HEPATITIS C ANTIBODY CHEMISTRY

Order as: Hepatitis C
Synonym: Anti-HCV
Patient Preparation: None
Specimen Collection/minimum amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hours (Monday – Friday)
Interpretation: Normal: Non-reactive

NOTE: A positive Hepatitis C antibody will automatically be referred for confirmation by RIBA (immunoblot assay).

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**HER-2/NEU**

Routinely performed on invasive breast carcinomas. Test can be performed on archival material. Contact Christopher Koenig, MD, at ext. 4889 with any questions. See **BREAST CANCER PROFILE** for additional information.

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**HETEROΦHILE ANTIBODY**

Order As: Heterophile Antibody Screen
Synonyms: Monospot, Monotest
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Performed Monday – Friday Day shift
Interpretation: Normal: Negative

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**HEXAGONAL PHOSPHOLIPID NEUTRALIZATION**

Order as Miscellaneous test
Synonym: Hex-phase pl
Patient preparation: None
Specimen Collection: Minimum Amount:
   Collect **two (2)** – 5 ml Blue top tubes (hemogard plastic), each with exactly 2.7 ml blood. Invert to mix specimen with anticoagulant.
Stat? No
Weekends/holidays: Will accept specimen
Turnaround Time: 1 week (Reference Lab procedure)
Interpretation: Normal: 0-10 seconds

-----------------------------------------

**HIGH MOLECULAR WEIGHT KININOGEN**

Order as: High Molecular Weight Kininogen on a Miscellaneous slip.
Patient Preparation: None
Specimen collection/minimum amount:
   Collect **four (4)** - 5 ml Blue top tubes(hemogard plastic), each with exactly 2.7 ml
blood. Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround time: 48 hours
Interpretation: 65 – 135%

HISTOPLASMA ANTIBODY  MICROBIOLOGY

Order As: Histoplasma Ab
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/ Holidays: Will accept specimen.
Turnaround time: 7 - 10 days (Reference Lab Procedure)
Interpretation: Normal: Negative.
Note: Any significant rise in titer from acute to convalescent phase serum is diagnostic of infection.

HLA TYPING DR  CHEMISTRY

Order As: Miscellaneous - HLA DR 2
Patient Preparation: Test must be scheduled in advance.
Specimen Collection/Minimum Amount: 7 ml blood into Lavender or Yellow top tube
 Specimens must be drawn Mon – Thurs before noon.
Note: Please specify if for tissue-typing or transplant
Stat?: No
Weekends/Holidays: No
Turnaround time: 3 days (Reference Lab Procedure)
Interpretation: Normal: See report

HLAB 27 ANTIGEN –
Performed in Special Diagnostic Immunology Laboratory ext. 4965

HOMOCYSTEINE  CHEMISTRY

Order as: Homocysteine
Patient preparation: None
Methodology: Fluorescence polarization
Specimen collection: 4 ml blood in gel barrier tube
Note: As the synthesis of homocysteine will continue in red blood cells even after specimen collection, it is very important to centrifuge and separate plasma and serum from the blood cells. Samples may be kept on ice for up to 6 hours prior to separation by centrifugation. Centrifuge samples at 1000xg for 10 minutes.
Stat? No  
Weekend/Holidays: Will accept specimen  
Turnaround time: 24 hours Monday - Friday  
Interpretation: Normal 0 - 15 umol/L  

HOMOVANILLIC ACID (HVA) - 24 hr urine  

**CHEMISTRY**  

Order As: HVA (24 hr Urine)  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 24 hour urine collection.  
**Note:** 50% acetic acid must be added to the specimen container prior to collection.  
Contact Chemistry x 4862. **HANDLE BOTTLE CAREFULLY.**  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 1 - 6 days (reference lab procedure)  
Interpretation: Age-specific reference ranges will appear on report.  

17-HYDROXYPROGESTERONE  

**CHEMISTRY**  

Order As: Hydroxyprogesterone – 17  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 3 ml blood in red top tube (rev. 6/2012)  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 1 week (Reference Laboratory test)  
Interpretation: Age and gender specific reference ranges will appear on report.  

HYDROXYPROLINE, TOTAL  

**CHEMISTRY**  

Order As: Hydroxyproline, total (24 hr urine)  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 24 hour urine collection with 6N HCL preservative before collection. Contact Chemistry x 4862. **HANDLE BOTTLE CAREFULLY.**  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 3 days (reference lab procedure)  
Interpretation: Normal: 7 - 43 mg/24 hr  

HYPERSENSITIVITY PNEUMONITIS PANEL  

**MICROBIOLOGY**  

Order As: Hypersensitivity Pneumonitis Panel
Synonym: Aspergillus sensitivity test
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 days (reference lab procedure)
Interpretation: Normal: See reference report

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**IFA LEGIONELLA - See LEGIONELLA, IFA**
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**IgE - Refer to Special Diagnostic Immunology Manual.**
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**IgG, IgA, IgM - See IMMUNOGLOBULINS**
-----------------------------------------------------------------------------------------------------------------------------

**IgG SUBCLASSES**

HEMATOLOGY

Order As: IgG subclass (1-4)
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in gel barrier tube.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Batched once per week
Interpretation: Normal ranges are age dependent

Adult: IgG subclass 1: 4.22 - 12.92 gm/L
       subclass 2: 1.17 - 7.47 gm/L
       subclass 3: 0.41 - 1.29 gm/L
       subclass 4: 0.01 - 2.91 gm/L

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**IgG SYNTHESIS RATE**

CHEMISTRY

Order As: IgG synthesis rate
Patient Preparation: None
Specimen Collection: Specimen collected by physician
Minimum Amount: 3 ml CSF and 3 ml blood gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 5 days (Reference Lab test)
Interpretation: IgG CSF: 0.0-8.6 mg/dl
       Albumin CSF: 11-48 mg/dl
IgG serum: 700-1600 mg/dl
Albumin serum: 3.5-5.5 g/dl
IgG/albumin CSF: 0.00-0.25
CSF/IgG index: 0.0-0.7
CSF/serum alb index: 0-8

---

**IMIPRAMINE**

<table>
<thead>
<tr>
<th>Order As:</th>
<th>Imipramine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonym:</td>
<td>Tofranil</td>
</tr>
<tr>
<td>Patient Preparation:</td>
<td>Collect immediately prior to next dose.</td>
</tr>
<tr>
<td>Specimen Collection: Minimum Amount:</td>
<td>8 ml blood in a red top tube <strong>without</strong> serum separator</td>
</tr>
<tr>
<td>Stat?: No</td>
<td></td>
</tr>
<tr>
<td>Weekends/Holidays:</td>
<td>Specimen will be accepted</td>
</tr>
<tr>
<td>Turnaround Time:</td>
<td>3 days (reference lab procedure)</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Normal: 170 - 300 ng/ml</td>
</tr>
</tbody>
</table>

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**IMMUNE COMPLEXES, C1q BINDING**

<table>
<thead>
<tr>
<th>Order as:</th>
<th>Immune complexes, C1q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonym:</td>
<td>Immune complexes C1q binding test, C1q Immune Complexes</td>
</tr>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen collection/minimum amount:</td>
<td>5 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat? No</td>
<td></td>
</tr>
<tr>
<td>Weekends/holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround time:</td>
<td>3-5 days (Reference lab procedure)</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Neg: Less than 4.4 ug Eq/ml</td>
</tr>
<tr>
<td></td>
<td>Pos: greater than 10.7 ug Eq/ml</td>
</tr>
<tr>
<td></td>
<td>Equivocal: 4.4 – 10.7 ug Eq/ml</td>
</tr>
</tbody>
</table>

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**IMMUNE COMPLEXES, RAJI CELL**

<table>
<thead>
<tr>
<th>Order as:</th>
<th>Miscellaneous – Immune complexes Raji Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Preparation:</td>
<td>None</td>
</tr>
<tr>
<td>Specimen collection/minimum amount:</td>
<td>5 ml blood in gel barrier tube</td>
</tr>
<tr>
<td>Stat? No</td>
<td></td>
</tr>
<tr>
<td>Weekends/holidays:</td>
<td>Will accept specimen</td>
</tr>
<tr>
<td>Turnaround time:</td>
<td>3-5 days (Reference lab procedure)</td>
</tr>
<tr>
<td>Interpretation:</td>
<td>Normal: Less than or equal to 15 ug Eq/ml</td>
</tr>
<tr>
<td></td>
<td>Equivocal: 15.1 – 19.9 ug Eq/ml</td>
</tr>
<tr>
<td></td>
<td>Positive: Greater than or equal to 20 ug Eq/ml</td>
</tr>
</tbody>
</table>

---
**IMMUNOFIXATION**

Order As: IFE SERUM, IFE URINE (as appropriate)
Synonyms: Immunoelectrophoresis, IFE Serum, IFE Urine
Patient Preparation: None
Specimen Collection: Minimum Amount:
- For IFE, serum: 5 ml blood in gel barrier tube
- For IFE, urine: 24 hour urine
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Test batched 2x weekly
Interpretation by Pathologist

**CHEMISTRY**

**IMMUNOGLOBULINS (IgG, IgA, IgM), SERUM**

Order As: Immunoglobulins Quant (all) or individually
Patient Preparation: None
Specimen Collection: Minimum Amount:
1) 2 ml blood in gel barrier tube
2) 2 gold top microtainers with serum separator
Stat?: no
Weekends/Holidays: Will accept specimen.
Turnaround Time: Test performed daily Mon-Fri
Interpretation: Adult Normal  IgG: 613 - 1295 mg/dl
                 IgA: 69 - 309 mg/dl
                 IgM: 53 - 334 mg/dl

**BLOOD BANK**

**INDIRECT COOMBS**

Order As: Coombs Test (indirect)
Patient Preparation: None
Specimen Collection/minimum amount:
10 ml blood in a purple-top tube. Label with (1) patient’s full name and medical record number or trauma/downtime number **EXACTLY** as it appears on the identaband, (2) date of collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. This information can be written directly on the vacutainer tube label or on a blood bank specimen label (available from the Blood Bank), taking care not to obscure the blank label beneath.

**IMPORTANT:** **INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.**
INSULIN ANTIBODY

Order As: Insulin Antibody
Patient Preparation: None
Specimen Collection: Minimum Amount: 4 ml blood in red top tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 9 days (reference lab procedure)
Interpretation: Normal: < 1.0 units/ml

INSULIN LEVEL

Order As: Insulin level
Patient Preparation: Fasting
Specimen Collection: Minimum Amount: 4 ml blood in red top tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Normal: 2.6 – 24.9 uIU/ml

INSULIN TOLERANCE

Order As: Insulin Tolerance Test
Patient Preparation: Fasting
Specimen Collection/minimum amount: Each specimen should be 5 ml blood in a gel barrier tube
   a) Draw fasting specimen
   b) Inject or administer orally the stimulating agent as ordered by the physician
   c) Draw specimen over the next 2 hours at timed intervals specified by the physician
Stat?: No
Weekends/Holidays: No
Turnaround Time: 3-5 days (reference lab procedure)
Interpretation: Consult pathologist

INTESTINAL PARASITES  -  See Microbiology Section H
IONIZED CALCIUM

Order as: Calcium, Ionized
Patient Preparation: None
Specimen collection, Minimum amount:
   1. 10 ml blood in GREEN TOP TUBE.
   2. Green-top Pediatric tube
Stat? Yes    Weekends/Holidays? Yes
Turnaround Time: Stat: 1 hr; Routine: 4 hrs
Interpretation: Normal: 4.75 – 5.30 mg/dl

NOTE: This test can be performed by Respiratory Care ONLY in NICU and PICU in conjunction with Blood Gases.

IONTOPHORESIS - See SWEAT TEST

IRON BINDING CAPACITY (IBC)

Order As: Iron total/TIBC/%Sat
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 208 - 428 mcg/dl

IRON, TOTAL

Order As: Iron
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 Hours
Interpretation: Normal: Male: 49-181 mcg/dl  Female: 37-170 mcg/dl
Order as: Joint fluid for crystals  
Patient preparation: none  
Specimen collection: joint fluid in green top tube  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround time: 24-48 hours  
Interpretation: crystal identification

---

**KAOLIN CLOTTING TIME**  
**HEMATOLOGY**

Order as: Kaolin Clotting time on a miscellaneous slip  
Patient preparation: None  
Specimen collection/minimum amount:  
- Exactly 2.7 ml in a 5 ml Blue top Hemogard plastic tube.  
- Invert to mix specimen with anticoagulant.  
Stat? No  
Weekends/Holidays: No  
Turnaround time: 48 hours  
Interpretation: 50 – 130 units

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**KEPPRA**  
**CHEMISTRY**

Order as: Keppra  
Synonym: Levetiracetam  
Patient Preparation: None  
Specimen Collection/Minimum amount: 3 ml blood in a red top tube  
Stat? No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 2 days (Reference Lab procedure)  
Interpretation: 12 – 46 mcg/ml

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**17-KETOGENIC STEROIDS**  
**CHEMISTRY**

Order As: 17-Ketogenic steroids  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 24 hour urine collection.  
**Note:** 50% acetic acid must be added to the specimen container prior to collection.  
Call the Chemistry Section at ext. 4862. (revised: 6/2012)  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 1 week (reference lab procedure)  
Interpretation: Normals:  
- Female: 3-15 mg/24 hrs  
- Male: 5-23 mg/24 hrs  
- Children: Up to 1 mg/24 hrs
**17-KETOSTEROIDS**

**CHEMISTRY**

Order As: 17 Ketosteroids, 24 hr urine
Patient Preparation: None
Specimen Collection: Minimum Amount: 24 hour urine collection.

*Note: 50% acetic acid must be added to the specimen container prior to collection.*

Call the Chemistry Section at ext. 4862. (revised: 6/2012)

Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 1 week (reference lab procedure)

Interpretation: Normals:

- >16 years male: 10-25 mg/24 hrs
- female: 6-14 mg/24 hrs

**KLEIHAUER-BETKE (FETAL HGB STAIN)**

**HEMATOLOGY**

Order As: Kleihauer-Betke
Patient Preparation: None – Test can be performed up to 72 hours post partum.
Specimen Collection/minimum amount:

1 ml blood in 5 ml Lavender top tube (Hemogard tube).

*Invert to mix specimen with anticoagulant.*

Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 8 hours (Specimen must be received by 11 AM)
Interpretation: Normal: 0% - 0.6% fetal cells

**KOATE** - See FACTOR VIII (8) CONCENTRATE

**KOH SMEAR** - See Microbiology Section

**LACTIC ACID (LACTATE - Plasma or CSF)**

**CHEMISTRY**

Order As: Lactic Acid
Patient Preparation: None
Specimen Collection: Minimum Amount:

1) Plasma: 1 full gray top tube
2) CSF: 1 ml

**DO NOT SEND SPECIMEN THROUGH THE PNEUMATIC TUBE SYSTEM. TRANSPORT IMMEDIATELY TO LABORATORY BY COURIER**

Stat?: Yes
Weekends/Holidays: Yes
LACTOSE TOLERANCE

Order As: Miscellaneous - Lactose Tolerance Test
Patient Preparation:
1) Schedule test with Chemistry X 4862 at least 24 hours in advance.
2) At or about 8 AM, the Diagnostic Technician will draw a fasting blood specimen and administer an oral lactose solution (100gm in 300 ml water).
   NOTE: For infants and children, a dose of 1.7 gm/kg body weight is used. Inform the laboratory at the time of scheduling if the patient is in this age category.
3) At 15 min, 30 min, 1 hour, 1½ and 2 hour intervals, blood specimens will be drawn by the technician.
Specimen Collection/Minimum Amount: 1 Grey top tube for each specimen.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hours
Interpretation: A flat lactose tolerance curve indicates either a deficiency of lactose or an inability to absorb hexose.

LA PROFILE (LUPUS ANTICOAGULANT)

Order As: LA Profile with clin interp
Includes: PT, PTT, Thrombin Time, DRVVT (LA Screen and Confirm), and interpretation by Pathologist. Depending upon the test results, may also include: PT Mixing Study, PTT Mixing Study (1:1), PTT Mixing Study (4:1), Factors II, V, VII, VIII, IX, X, XI, XII.
Patient Preparation: Patient must not be on any anticoagulant therapy.
Specimen Collection/minimum amount: 1.7 ml blood in each of three 5 ml Blue top tubes (Hemogard plastic).
   Invert to mix specimens with anticoagulant.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hours
Interpretation: All LA Profiles that are outside the established reference ranges and for which a pathologist interpretation has been requested, will be reviewed and signed out by a pathologist. LA Profile values that are within reference ranges will be reported as within the reference range by the Section head or Assistant Section Head and will not be reviewed by a pathologist.
LA PROFILE (LUPUS ANTICOAGULANT)  HEMATOLOGY
WITHOUT CLINICAL INTERPRETATION

Order As: LA Profile no clin interp
Includes: PT, PTT, Thrombin Time, DRVVT (LA Screen and Confirm).
Patient Preparation:
   **Patient must not be on any anticoagulant therapy.**
Specimen Collection/minimum amount: 2.7 ml blood in each of three 5 ml Blue top tubes (Hemogard plastic). **Invert to mix specimens with anticoagulant.**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 24 hours
Interpretation: See normals for individual tests

LD (Body fluid, CSF)  CHEMISTRY

Order As: LD (Body fluid) or LD (CSF) as applicable
Synonym: Lactic dehydrogenase
Patient Preparation: None
Specimen Collection: Minimum Amount: 1) 3 ml body fluid, 2) 1 ml CSF
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: Up to 108 IU/L

LD (Serum)  CHEMISTRY

Order As: Total LD
Synonym: Lactic dehydrogenase
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in gel barrier tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: 4 hours
Interpretation: Normal: 313-618 IU/L

LDL (LOW DENSITY LIPOPROTEIN) – CALCULATED)  CHEMISTRY

Order as part of the Lipid Panel, which includes: cholesterol, triglycerides, HDL, calculated LDL.

**LDL DIRECT**

**CHEMISTRY**

Order As: LDL direct  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube  
Stat?: No  
Weekends/ Holidays: Will accept specimen  
Turnaround Time: 24 hours  
Interpretation: desirable: less than 160 mg/dl

**LEAD (BLOOD)**

**CHEMISTRY**

Order As: Lead  
Patient Preparation: None  
Specimen Collection: Minimum Amount:  
   Preferred: 3 ml in ROYAL BLUE top tube  
   Will accept: 3 ml in TAN top tube  
   **Invert to mix specimen with anticoagulant.**  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 3 days (reference lab procedure)  
Interpretation: Adult: 0-40 ug/dl (OSHA standard);  
Child 0 – 6 years: 0 - 4 mcg/dl; child > 7 years: 0 – 9 mcg/dl

**LEAD (URINE)**

**CHEMISTRY**

Order As: Lead (24 hr urine)  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 24 hour urine collection.  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 2 days (reference lab procedure)  
Interpretation: 0 – 4 mcg/specimen.

**LECITHIN/SPHINGOMYELIN RATIO** - See LS/PG

**LEGIONELLA ANTIGEN, URINARY**

**MICROBIOLOGY**

Order as: Legionella Antigen  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 10 ml random urine  
Stat?: Yes  
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hours (Monday – Friday)
Interpretation: Normal: Negative

LEGIONELLA - IFA

Order As: IFA Legionella
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in red top tube
Stat?: No
Weekends/Holidays: No
Turnaround Time: Test batched twice weekly
Interpretation: Less than 1:128

LEUKOCYTE CONCENTRATE

Order As: Ordering blood components for administration/leukocyte concentrate
Patient Preparation: None
Specimen Collection:
Purple-top tube. Label with (1) patient’s full name and Medical Record number or Trauma number exactly as it appears on the Identaband, (2) date of collection also time if possible), and (3) circled signature signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.
Minimum amount: Adult: 7 ml blood in a 10 ml purple-top tube
           Infant: 2 ml blood in a pediatric purple-top tube
Stat?: No
Weekends/Holidays: No
Turnaround Time: Dependent on donor availability
Interpretation: N/A

LIGHT CHAINS, FREE (URINE KAPPA/LAMBDA)

Order As: Urine Kappa/Lambda Quantitation
Patient Preparation: None
Specimen Collection: 24 hour urine. No preservative.
Stat?: No
Weekends/Holidays: no
Turnaround Time: 5 days (Reference Laboratory test)
Interpretation: Urine Kappa 1.35 – 24.19 mg/L
           Urine Lambda 0.24 – 6.66 mg/L
**LIPASE (SERUM)**

**CHEMISTRY**

Order As: Lipase  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr; Routine: 4 hrs  
Interpretation: Normal: 23-300 U/L

**LIPID PANEL**

**CHEMISTRY**

Order As: HDL/LDL  
Includes: Cholesterol, Triglycerides, HDL, LDL (calculated).  
Patient Preparation: Fasting  
Specimen Collection/Minimum Amount: 8 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 24 hours  
Interpretation: Normal:  
  - Cholesterol: <200 mg/dl  
  - Triglycerides: 60-160 mg/dl  
  - HDL: 35-150 mg/dl  
  - LDL (calculated): 0-129 mg/dl

**NOTES:**  
- a direct LDL will be performed when a Lipid Panel triglyceride value is greater than 400 mg/dl  
- The ordering physician/hospital service will be notified of a triglyceride level equal to or greater than 200 mg/dl on patients from birth to 1 year of age ONLY.

**LIPIDS, TOTAL (SERUM)**

**CHEMISTRY**

Order As: Lipids (Total)  
Patient Preparation: Fasting 14-16 hours  
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 3 days (reference lab procedure)  
Interpretation: Normal: Adult: 250-850 mg/dl
LITHIUM

Order As: Lithium  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: yes  
Weekends/Holidays: yes  
Turnaround Time: Stat: 1 hr; Routine: same day  
Interpretation: Therapeutic range: 0.5-1.0 mEq/L; Toxic: Greater than 2.0 mEq/L

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LOW DENSITY LIPOPROTEIN - See LDL

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LOW MOLECULAR WEIGHT HEPARIN (LMWH) – See FACTOR Xa

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LS/PG RATIO (Amniotic Fluid)

Order as: LS/PG Ratio  
Synonym: Lecithin/Sphingomyelin Ratio, L/S Ratio, Phosphatidyl Glycerol  
Includes: PG and Creatinine  
Patient Preparation: Contact Ultrasound (X 2202) and notify Chemistry Section (X 4862) when procedure is scheduled.  
Specimen Collection: 7 ml amniotic fluid. PROTECT FROM LIGHT.  
Stat?: Stat reference lab pickup is available for this test. Turnaround time is 6 hours from receipt at Labcorp.  
Weekends/Holidays: No  
Turnaround Time: 24 hours (Reference Lab)  
Interpretation: Ratio greater than 2:1 indicates adequate fetal lung maturity.

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LUPUS ANTICOAGULANT PROFILE - See LA PROFILE with or without clinical interpretation

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LUPUS ANTICOAGULANT SCREEN

Order as: Lupus anticoagulant screen  
Synonym: DRVVT, Dilute Russell Viper Venom  
Includes: LA Screen and LA Confirmatory  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
**EXACTLY:** 2.7 ml blood in 3 ml Blue top tube (Hemogard plastic).  
**Invert to mix specimen with anticoagulant.**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 hours
Interpretation: Normal: LA Screen: Negative; LA Confirmatory: < 1.20

LUTEINIZING HORMONE (LH), SERUM

Order As: Leuteinizing Hormone (LH)
Patient Preparation: None
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Run 7 days/week, Day shift.
Interpretation: Normals:
  Adult males: 1.4-7.7 MIU/ml
  Adult females:
    Follicular 1.6-8.3 MIU/ml
    Luteal 0.0-8.1 MIU/ml
    Oral contraceptives 0.0-8.0 MIU/ml

LYME ANTIBODY (CSF)

Order As: Lyme antibody (CSF)
Patient Preparation: None
Specimen Collection: Minimum Amount: 1 ml CSF
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 7 days (reference lab procedure)
Interpretation: Normal: Negative

LYME ELISA G & M

Order As: Lyme Immunoglobulin G/M
Synonym: Lyme titer
Patient Preparation: None
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: Batched test performed once per week.
Interpretation: Normal: Negative = 0 - 0.99 LIV
NOTE: All specimens with equivocal or positive enzyme-linked immunosorbent (ELISA) findings for Borrelia burgdorferi IgG/IgM will reflexively be sent out for supplemental Western Blot testing prior to reporting the final results.
LYME DISEASE WESTERN BLOT  
Order As: Lyme western blot  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 4 days (reference lab procedure)  
Interpretation: Normal: Negative

LYSOZYME (MURAMIDASE)  
Order As: Lysozyme, serum  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml lavender top tube (rev. 6/2012)  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 5 days (reference lab procedure)  
Interpretation: Normal: 2.7 – 9.4 mcg/ml

MACROSCOPIC EXAMINATION, INSECT  
Order as: Macroscopic Examination, Parasitology  
Patient Prep: None  
Specimen collection: Place suspect insect in a tightly secured container.  
Stat: No  
Weekend/Holidays: Will accept specimen  
Turnaround Time: Final report: 24 – 72 hours  
Interpretation: Species identification dependent on specimen quality.

MACROSCOPIC EXAMINATION, WORM  
Order as: Macroscopic Examination, Worm  
Patient Prep: None  
Specimen collection: Place suspect worm in a tightly secured container.  
Stat? No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: Final report: 24 – 72 hours  
Interpretation: Species identification dependent on specimen quality.
**MAGNESIUM**

Order As: Magnesium  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 4 ml blood in gel barrier tube  
Stat?: yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 4 hours  
Interpretation: 1.8-2.4 mg/dl

**MALARIAL SMEAR** - See Microbiology Section I

**MEGALOBLASTIC ANEMIA PANEL**

Order As: Megaloblastic Anemia Panel  
Includes: Homocysteine, Methylmalonic acid, 2-Methylcitric acid and cystathionone  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 3 days (reference lab procedure)  
Interpretation: normal: Homocysteine: 5.1–13.9 umol/L  
Methylmalonic acid: 73–376 umol/L  
2-methylcitric acid: 60–228 nmol/L  
cystathionone: 44–342 nmol/L

**MEPHOBARBITAL (MEBARAL)**

Order As: Mephobarbital  
Patient Preparation: None  
Specimen Collection: Minimum Amount:  
5 ml blood in a red top tube without serum separator  
or 1 lavender top tube.  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 2 days (reference lab procedure)  
Interpretation: Normal: 8 – 15 mcg/ml

**METANEPHRINES**

Order As: Metanephrines  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 24 hour urine collection.
Note: Boric acid or 50% acetic acid must be added to the specimen container prior to collection. Contact Chemistry x4862. Handle bottle carefully.

Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Age-specific reference ranges will be indicated on the report.

METHANOL

Order As: Methanol
Synonym: Methyl alcohol
Patient Preparation: DO NOT PREPARE SITE WITH ALCOHOL SWAB.
Specimen Collection: Minimum Amount:
   Blood: 4 ml in grey top tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 4 days (reference lab procedure)
Interpretation: Normal: Negative

METHOTREXATE

Order As: Methotrexate peak, trough or random as applicable.
Patient Preparation: Patient must be on Methotrexate
Specimen Collection:
   Peak: Draw at end of infusion.
   Trough: Draw blood prior to administration of next dose.
Minimum Amount: 5 ml blood in a red top tube without serum separator.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 2 hours; Routine: 24 hours
Interpretation: Age and dose dependent – to be interpreted by the ordering physician

MEXILETINE

Order As: Mexiletine
Patient Preparation: None
Specimen Collection: Minimum Amount: 5 ml blood in red top tube without serum separator.
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Therapeutic: 0.8-2.0 mcg/ml; Toxic: > 2.00 mcg/ml

MICROBILIRUBIN (Infants <6 Months)
Order As: Microbilirubin
Patient Preparation:  
   Performed only on infants less than 6 months old.
Specimen Collection: Minimum Amount:  
   Gold top microtainer with serum separator - 1/2 full.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 2 hours
Interpretation: Normal: Less than 12 mg/dl by third day.

MICROBILIRUBIN DIRECT (Infants <6 Months)  CHEMISTRY

Order As; Microbilirubin Direct
Patient Preparation: Performed only on infants less than 6 months old.
Specimen Collection/Minimum Amount:  
   Gold top microtainer with serum separator - 1/2 full
Stat?: Yes
Weekend/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normal: 0.0-0.6 mg/dl

MICROSPORIDIUM  MICROBIOLOGY

Order as: Microsporidium spore detection
Patient Preparation: None
Specimen collection: Random fresh stool specimen (white vial)
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 72 hours (Reference Lab procedure)
Interpretation: Normal: No Microsporidia detected

MINI SCREEN  See BASIC METABOLIC PANEL (BMP) CHEMISTRY

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MOLECULAR COAGULATION PANEL  MOLECULAR

Order as: Molecular Coagulation Panel
Includes: Factor V Leiden, Factor II (prothrombin) 20210A mutation, and MTHFR 677T
Method: PCR
Patient preparation: None
Specimen collection/minimum amount: 3.0 ml blood in each of 2 lavender top vacutainer tubes.
Invert to mix specimen with anticoagulant.
MOLECULAR GENETIC ANALYSIS  PAI-1 LOCUS 4G/5G  

See PAI-1 4G/5G

MONOSPOT - See Heterophile Antibody

MTHFR 677T by PCR – performed as part of the Molecular Coagulation Panel in the Molecular Lab

MURAMIDASE - See Lysozyme

MYCOBACTERIA TUBERCULOSIS, AMPLIFIED DIRECT TEST

Available on smear positive specimens. Contact Tao Hong, PhD in Microbiology Section at ext. 4854 or ext. 4859 with questions.

MYELIN BASIC PROTEIN  

CHEMISTRY

Order As: Myelin basic protein
Patient Preparation: None:
Specimen Collection: Minimum Amount: 2 ml CSF
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 days (reference lab procedure)
Interpretation: Normal: 0.0 – 1.0 ng/ml

MYELOMA PROTEIN - See Protein Electrophoresis (Urine)

MYELOPEROXIDASE STAIN  

HEMATOLOGY

Order As: Myeloperoxidase stain
Patient Preparation: None
Specimen Collection/minimum amount:
(1) 1 ml blood in 5 ml Lavender top tube.
   **Invert to mix specimen with anticoagulant.**
(2) 2 – 4 bone marrow slides or peripheral smears.

Stat?: No  
Weekends/Holidays: No  
Turnaround Time: 8 hours  
Interpretation: Consult Pathologist.

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**MYOGLOBIN (SERUM)**

**CHEMISTRY**

Order as: Myoglobin (serum)  
Patient preparation: none  
Specimen collection: Blood: 1 gel barrier tube  
Stat?: No  
Weekends/holidays: Will accept specimen  
Turnaround Time: 2 days (Reference Lab procedure)  
Interpretation: ≤ 90 mcg/L

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**MYOGLOBIN (URINE)**

**CHEMISTRY**

Order As: Myoglobin (random urine)  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 5 ml random urine  
Stat?: No  
Weekends/Holidays: No  
Turnaround Time: 24 hours  
Interpretation: Normal: negative

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**MYSOLINE** - See PRIMIDONE

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**NAPHTHYL ACETATE STAIN** - See Esterase Stain

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**NEURON SPECIFIC ENOLASE-ARUP**

**CHEMISTRY**

Order As: Neuron Specific Enolase-ARUP  
Synonym: NSE  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 4 ml blood in red top tube  
Stat?: No. performed Mon, Wed, Fri only.  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 1-4 days (reference lab procedure)  
Interpretation: N/A See report for reference ranges

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**NORPACE CHEMISTRY**

Order As: Norpace
Synonym: Disopyramide
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in red top tube without gel barrier
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 1 days (reference lab procedure)
Interpretation: Therapeutic: 2.0-5.0 mcg/ml; Potentially toxic: > 7.0 mcg/ml

**NUCLEOTIDASE CHEMISTRY**

Order As: Nucleotidase
Patient Preparation: None
Specimen Collection: Minimum Amount: 4 ml blood in red top tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 - 5 days (reference lab procedure)
Interpretation: Normal: 0 - 15 U/L

**OCCULT BLOOD (STOOL) CHEMISTRY**

Order As: Occult Blood (Stool)
Patient Preparation: None
Specimen Collection: Minimum Amount: Random Stool
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: Negative

**OLIGOCLONAL BANDS (CSF) HEMATOLOGY**

Order As: Oligoclonal Bands
Patient Preparation: None
Specimen Collection: Specimen collected by physician.
Minimum Amount: 3 ml CSF specimen and 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimens
Turnaround Time: Batched test – performed once/week
Interpretation: Pathologist interpretive report will be issued.

**ORGANIC ACID SCREEN (Urine) CHEMISTRY**

Order As: Organic acid screen (urine)
**OSMOLALITY (Serum)**

Order As: Osmolality
Patient Preparation: None
Specimen Collection: Minimum Amount: 5 ml blood in gel barrier tube
Stat?: Performed stat for craniotomy patients ONLY.
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: 280-300 mOsm/kg

**OSMOLALITY (Urine)**

Order As: Osmolality (urine)
Patient Preparation: None
Specimen Collection: Minimum Amount: Random urine or 24 hour urine collection - dependent on ordering physician
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normals: Random: 50-1400 mOsm/kg of body water
24 hr.: 600-900 mOsm/kg of body water

**OSMOTIC FRAGILITY**

Order As: Osmotic Fragility
Patient Preparation: None
Specimen Collection/Min. Amount:
5 ml blood in lavender top tube.
Invert to mix anticoagulant with specimen.
IMPORTANT! Send specimen immediately to HUMC Lab since specimens must arrive at the reference lab within 72 hours of draw.
Stat?: No
Weekends/Holidays: Monday-Friday only.
Turnaround Time: 1 week (Reference Lab test)
Interpretation: 0.50 g/dl NaCl (unincubated)
- Males: 0.0-47.8% hemolysis
- Females: 0.0-31.1% hemolysis
0.60 g/dl NaCl (incubated)
- males: 18.7-67.4% hemolysis
females: 10.9-65.5% hemolysis
0.65 g/dl NaCl (incubated)
males: 4.4-36.6% hemolysis
females: 0.2-39.3% hemolysis
0.75 g/dl NaCl (incubated)
males: 0.8-9.1% hemolysis
females: 0.0-10.9% hemolysis

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**OXALATE - 24 HR. URINE**

Order As: Oxalate (24 hr urine)
Patient Preparation:
Specimen Collection: Minimum Amount: 24 hour urine collection.
Must add Hydrochloric acid (HCL) to container prior to collection. Contact Chemistry x 4862. Handle bottle carefully.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Normal: 9.7 – 40.5 mg/specimen

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**PACKED CELLS**

Order As: Ordering packed red blood cells
Patient Preparation: None
Specimen Collection:
Label purple top tube with 1) Patient’s full name and medical record number or trauma number exactly as it appears on the Identaband, (2) date of specimen collection (also time if possible), and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank) taking care not to obscure the blank tube label beneath.
Minimum Amount: Adult: 5 ml blood in a purple top tube
Infant: 2 ml blood in a purple top tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 45 minutes; Routine: Same Day
Interpretation: N/A

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**PAI-1 LOCUS 4G/5G**

Order as: Miscellaneous test – PAI-1 4G/5G
Patient Preparation: None
Specimen collection/minimum amount: 2 lavender tubes. Keep at Room temperature.
Stat? No
Weekends/Holidays: Will accept specimens
Turnaround Time: 1 week (Reference laboratory procedure)
Interpretation: See report

PAP SMEAR - See Cytology Section

PARATHYROID HORMONE (PTH) CHEMISTRY

Order As: PTH intact
Patient Preparation: None
Specimen Collection: Minimum Amount: 10 ml blood in gel barrier tube
Stat?: ONLY for intra-operative parathyroidectomy cases.
Weekends/Holidays: Saturday only – do not collect specimen on Sunday or holiday!
Turnaround Time: 24 hours
Interpretation: Intact Adult: 12–65 pg/ml; Pediatric (2-20 yr): 9-52 pg/ml

PARTIAL THROMBOPLASTIN TIME - See P.T.T.

PCP (Urine) CHEMISTRY

Order As: PCP urine (also included in DRUG SCREEN, URINE)
Synonym: Phencyclidine, Sernyl, “Angel Dust”
Patient Preparation: None
Specimen Collection: Minimum Amount: 25 ml random urine
Stat?: No
Weekends/ Holidays: Will accept specimen
Turnaround Time: Stat: 2 hrs.; Routine: Day shift
Interpretation: Negative or See Report

PFA 100 HEMATOLOGY

Order as: Platelet Function Screen
Synonym: Platelet Function Screen
Patient Preparation: None
Specimen Collection:Minimum Amount: Exactly 2.7 ml in a 5 ml Blue top tube
Stat?: Yes
Weekends/holidays: Yes
Turnaround time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normals: Coll/Epi: 86-194 seconds
Coll/ADP: 57-106 seconds
**PHENCYCLIDINE** – See PCP

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**PHENOBARBITAL LEVEL**

Order As: Phenobarbital level  
Patient Preparation: Specimen should be drawn 1-2 hrs. after phenobarbital administration. 
Specimen Collection: Minimum Amount: 3 ml blood in red top tube without gel barrier. 
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 4 hours  
Interpretation: Therapeutic range: 15-40 ug/ml; Potentially toxic: >40 ug/ml

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**PHENYTOIN**

Order as: Phenytoin  
Synonym: Dilantin  
Patient Preparation: None  
Specimen Collection, Minimum Amount: 3 ml blood in red top tube without gel barrier.  
Specimen must be drawn at least 2-3 hours after last dose. 
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr; Routine: 1 day  
Interpretation: Therapeutic range: 10-20 mcg/ml

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**PHOSPHATIDYL GLYCEROL** - See LS/PG

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**PHOSPHORUS (Serum)**

Order As: Phosphorus  
Patient Preparation: None  
Specimen Collection: Minimum Amount: 
1) 1 ml blood in gel barrier tube  
2) Gold top microtainer with serum separator - 1/2 full  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 4 hours  
Interpretation: Normal: 2.7-4.3 mg/dl

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**PHOSPHORUS (Urine)**

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Order As: Phosphorus (24 hr Urine)
Patient Preparation: None
Specimen Collection: Minimum Amount:
   24 hour urine collection with HCL preservative. Contact Chemistry Section x 4862.
   HANDLE CONTAINER CAREFULLY.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Normal: 400-1300 mg/24 hrs.

PINWORM PREP - See Microbiology Section K

PKU (PHENYLKETONURIA) MICROBIOLOGY

Ordered As: PKU Note: NJ Health Dept. form must be completed.
Patient Preparation: None
Specimen Collection/ minimum amount:
   Thoroughly saturate the 5 circled areas indicated on the N.J. Health Dept. form with blood from a heel stick.
The 5 circled areas must be completely filled and saturated through to the other side.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 1 week (N.J. State Dept of Health Lab Procedure)
Interpretation: Normal: Negative

PLASMINOGEN HEMATOLOGY

Order As: Plasminogen
Patient Preparation: None
Specimen Collection: Minimum Amount:
   Exactly 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   Invert to mix anticoagulant with specimen
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 hours
Interpretation: Normal: 80 - 120%

PLASMINOGEN ACTIVATOR INHIBITOR 1 ACTIVITY HEMATOLOGY

Order As: Plasminogen Activator Inhibitor 1 Activity
Synonyms: PAI-1
Patient Preparation: None
Specimen Collection: Minimum Amount:
   Collect blood in two (2)- 5 ml Blue top tubes (Hemogard plastic), each with exactly 2.7
ml blood
Stat? No
Weekends/holidays: Will accept specimen
Turnaround time: 1 week (Reference Lab procedure)
Interpretation: Normal: 0-31 IU/ml

PLASMINOGEN ACTIVATOR INHIBITOR 1 ANTIGEN  HEMATOLOGY

Order As: Plasminogen Activator Inhibitor 1 Antigen
Synonyms: PAI-1 Ag
Patient Preparation: None
Specimen Collection: Minimum Amount:
   Collect **two (2)** 5 ml Blue top tubes (Hemogard plastic), each with exactly 2.7 ml blood
Stat? No
Weekends/holidays: Will accept specimen
Turnaround time: 2 weeks (Reference Lab procedure)
Interpretation: 4-43 ng/ml

PLATELET AGGREGATION  HEMATOLOGY

Order As: Platelet Aggregation
Patient Preparation:
   **Must be scheduled in advance with Hematology at ext. 4885**. No aspirin or aspirin-containing compounds for 7-10 days prior to testing.
Specimen Collection: minimum amount:
   Collect **Six (6)** Blue Top Tubes (Hemogard plastic), each with **exactly** 2.7 ml blood **and** 1 lavender Hemogard tube with at least 1 ml blood. Invert to mix specimens with anticoagulant.
   **IMPORTANT: DO NOT SEND THROUGH PNEUMATIC TUBE SYSTEM. SPECIMEN SHOULD BE HAND-DELIVERED TO HEMATOLOGY.**

Stat?: No
Weekends/Holidays: No
Turnaround Time: 24-48 hours
Interpretation: Consult Pathologist.

PLATELET ANTIBODY  HEMATOLOGY

Order as: Platelet antibody
Synonyms: Platelet antibody (indirect), HLA, Platelet glycoprotein
Patient Preparation: None
Specimen collection/minimum amount: 3 ml blood in gel barrier tube
Stat? No
Weekends/holidays: Will accept specimen
Turnaround time: 48 hours (Reference Lab procedure)
Interpretation: Normal: Negative

PLATELET CONCENTRATE or PHERESIS PLATELETS  BLOOD BANK

Order As: Ordering components for administration/platelets concentrate or platelet pheresis as applicable
Patient Preparation: None
Specimen Collection: Purple-top tube.
    Label with (1) patient’s full name and medical record number or Trauma number exactly as it appears on the Identaband, (2) date of collection (also time if possible) and (3) circled signature of the person who drew the specimen and a second verifying signature. The information can be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.

NOTE: A tube must be drawn only if blood group and Rh type has not been determined by the hospital Blood Bank during the same admission.

IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.

Minimum Amount:  Adult:  5 ml blood in a purple-top tube.
                 Infant: 0.5 ml blood in pediatric purple top.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Dependent upon availability from Blood Center
Interpretation: N/A

PLATELET COUNT  HEMATOLOGY

Order As: Platelet Count
Patient Preparation: None
Specimen Collection/minimum amount:
    1 ml blood in 5 ml Lavender top Hemogard tube
    Micro specimens: 400 lambda blood in a lavender microtainer.
        Invert to mix specimen with anticoagulant.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: 135,000 - 430,000

PLATELET FUNCTION SCREEN (PFA 100)  HEMATOLOGY
Order as: Platelet Function Screen
Synonym: PFA 100
Patient Preparation: None
Specimen Collection: Minimum Amount:
   **Exactly** 2.7 ml in a 5 ml Blue top tube
Stat?: Yes
Weekends/holidays: Yes
Turnaround time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normals: Coll/Epi: 86-194 seconds
   Coll/ADP: 57-106 seconds

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PLATELET NEUTRALIZATION PROCEDURE

HEMATOLOGY

Order as: PNP
Synonym: PNP
Patient Preparation: None
Specimen Collection/minimum amount:
   Exactly 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   INVERT tube to mix specimen with anticoagulant.
Stat?: No
Weekends/holidays: Will accept specimen
Turnaround time: 48 hours (Reference Lab procedure)
Interpretation: 0-3 seconds

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PNEUMOCOCCAL ANTIBODY

MICROBIOLOGY

Order as: Pneumococcal Ab
Patient Preparation: None
Specimen Collection/minimum amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 7 – 10 days (reference lab procedure)
Interpretation: Detects antibodies to 23 specific pneumococcal serotypes. Pre- or post-vaccination monitoring.

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PNH (PAROXYSMAL NOCTURNAL HEMOGLOBINURIA)

This test is performed in the Special Diagnostic Immunology Laboratory, 1 Pavilion East.
For details, refer to the on-line SDIL Specimen Collection Manual or call ext. 4965..
Order As: Porphobilinogen
Patient Preparation: None
Specimen Collection: Minimum Amount:
   1) Random urine: 25 ml **Protect sample from light.**
      1) 24 hour urine collection - 30 ml 33% glacial acetic acid preservative prior to collection. Handle bottle carefully. **Protect sample from light.**
Stat?: No
Weekends/Holidays: No
Turnaround Time: 2 days (reference lab procedure)
Interpretation: Normal: 24 hr: 0.0-1.5 mg/24hr; Random: 0.0-2.0 mg/L

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**PORPHYRINS**

Order as: Miscellaneous - Porphyrs
Includes: Uroporphorin and coproporphyrin
Patient Preparation: None
Specimen Collection: Minimum Amount: 25 ml of a 24 hr urine. **Protect sample from light.**
Stat?: No
Weekends/Holidays: No
Turnaround Time: 2 days (reference lab procedure)
Interpretation: See Report

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**POTASSIUM (Serum)**

Order as: Potassium
Synonym: K
Patient Preparation: None
Specimen Collection: Minimum Amount:
   1) 3 ml blood in gel barrier tube
   2) Gold top microtainer with serum separator - 1/2 full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normal: 3.5-5.2 mEq/L
   NOTE: Results can be falsely elevated in hemolyzed samples.

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**POTASSIUM (Urine)**

Order As: Potassium (random urine)
Synonym: K
Patient Preparation: None
Specimen Collection: Minimum Amount: Random urine or 24 hour urine. Collection is dependent on ordering physician
Stat?: No
PREALBUMIN

Order as: Prealbumin
Patient Preparation: None
Specimen Collection/Minimum Amount: 2 ml in gel barrier tube or by heel stick on newborns (2 yellow microtainers).
Stat? No
Weekends/Holidays: Yes
Turnaround Time: 4 hours
Interpretation:
- Full term infants 0-5 days: 6-21 mg/dl
- 6 days – 1 year: 9.6-32 mg/dl
- 2-5 years: 14-30 mg/dl
- 6-9 years: 15-33 mg/dl
- 10-13 years: 20-36 mg/dl
- 14 years and above: 20-40 mg/dl

(Revised 5/15/2014)

PREGNANCY TEST (SERUM) - See BETA HCG TITER (QUANTITATIVE)

PREKALLIKREIN ASSAY

Order as: Miscellaneous - Prekallikrein
Patient Preparation: None
Specimen Collection:
Collect four (4) Blue top tubes (hemogard plastic), each with exactly 2.7 ml. Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround time: 7 days
Interpretation: 65 – 135%

PRIMIDONE

Order As: Primidone
Synonym: Mysoline
Patient Preparation: None
Specimen Collection: Minimum Amount:
3 ml blood in red top tube without serum separator.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 3 days (Reference Lab Procedure)
Interpretation: Therapeutic range: 5-12 ug/ml

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**PROCANAMIDE/NAPA**

Order As: Procan/Napa level
Patient Preparation: None
Specimen Collection: Minimum Amount:
5 ml blood in red top tube without serum separator.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 48 hours (Reference Lab procedure)
Interpretation: Therapeutic: 10-30 ug/ml as combined sum of NAPA and Procanamide.

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**PROGESTERONE LEVEL (Serum)**

Order As: Progesterone level
Patient Preparation: None
Specimen Collection: Minimum Amount: 6 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes – day shift only.
Turnaround Time: 24 hours. Test run 7 days/week on day shift only.
Interpretation: Normal: All normals are in ng/ml.
- Male: Adult 0.21-1.54
- Female: Follicular 0.14-2.03
- Periovulatory 0.40-4.47
- Mid luteal 5.22-22.7
- Luteal 1.42-16.6
- Pregnant 1st trimester 6.57-40.3
  2nd trimester 9.66-62.3
  3rd trimester 24.5-33.4
- Post-menopausal 0.15-1.04

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**PROLACTIN**

Order As: Prolactin
Patient Preparation: None
Specimen Collection/Minimum Amount: 6 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes – day shift only
Turnaround Time: 24 hours. Test run 7 days/week on day shift only.
Interpretation: Normal: Female: 3.0 – 20.0 ng/ml; Male: 2.5 - 17.0 ng/ml

PRONESTYL - See PROCANAMIDE/NAPA

PROSTATE SPECIFIC ANTIGEN (PSA) CHEMISTRY

Order As: Prostate-Specific Antigen (PSA)
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation:
0 -49 years 0.0-2.5 ng/mL
49-59 years 0.0-3.5 ng/mL
59-69 years 0.0-4.5 ng/mL
69-150 years 0.0-6.5 ng/mL (Revised: 7/3/12)

PROTEIN (CSF/Body fluid) CHEMISTRY

Order As: Protein (CSF) or Protein (Body Fluid) as applicable
Patient Preparation: None
Specimen Collection: Minimum Amount:
1) 3 ml CSF
2) 5 ml body fluid
Stat?: CSF – yes; Body fluids - No
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr
Routine: CSF: 4 hrs; Body Fluids: 24 hrs
Interpretation: Normal: 12-60 mg/dl (CSF)

PROTEIN, TOTAL (Serum) CHEMISTRY

Order As: Protein-Total
Patient Preparation: None
Specimen Collection: Minimum Amount:
1) 1 ml blood in gel barrier tube
2) Gold top microtainer with serum separator - 1/2 full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normal: 6.0-8.3 gm/dl
**PROTEIN (Urine-Quantitative)**

**CHEMISTRY**

Order As: Protein - Quant (24 hr urine)
Patient Preparation: None
Specimen Collection: Minimum Amount: 24 hour urine collection
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hours
Interpretation: Normal: 42 – 225 mg/24 hrs

**PROTEIN C**

**HEMATOLOGY**

Order As: Protein C
Patient Preparation: None
Specimen Collection: Minimum Amount:
- **EXACTLY** 2.7 ml blood in a 5 ml Blue top tube (Hemogard plastic)
- Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 hours
Interpretation: Normal: 77 – 132%

**PROTEIN C ANTIGEN**

**HEMATOLOGY**

Order as: Protein C Antigen
Patient Preparation: None
Specimen Collection/minimum amount:
- 1 Blue top tube (Hemogard plastic), with exactly 2.7 ml blood
Stat: No
Weekends/Holidays: Will accept specimen
Turnaround time: 72 hours (Reference Laboratory procedure)
Interpretation: Normal: 60 - 150%

**PROTEIN ELECTROPHORESIS (Serum)**

**HEMATOLOGY**

Order As: Serum Protein Electrophoresis
Includes: Electrophoretic interpretation
Synonyms: SPE, SREP
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Batched test twice weekly
Interpretation: Pathologist interpretation.
**PROTEIN ELECTROPHORESIS (Urine)**  
**HEMATOLOGY**

Order As: Protein Electrophoresis (Urine)  
Includes: Electrophoretic interpretation  
Synonyms: UPE, UPEP, Bence-Jones urine, Light Chain urine.  
Patient Preparation: None  
Specimen Collection: Minimum Amount:  
24 hour urine collection - No preservative.  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: Batched test – twice weekly  
Interpretation: Pathologist interpretation.

**PROTEIN S**  
**HEMATOLOGY**

Order As: Protein S  
Patient Preparation: None  
Specimen collection/minimum amount:  
**EXACTLY** 2.7 ml blood in a 5 ml Blue top tube (Hemogard plastic)  
**Invert to mix specimen with anticoagulant.**  
Stat: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 4 hours  
Interpretation: normal: 65 –140%

**PROTEIN S ANTIGEN, FREE**  
**HEMATOLOGY**

Order as: Protein S Antigen, Free  
Patient Preparation: None  
Specimen Collection/minimum amount:  
1 Blue top tube (Hemogard plastic), with **exactly** 2.7 ml blood  
Stat: No  
Weekends/Holidays: Will accept specimen  
Turnaround time: 72 hours (Reference Laboratory procedure)  
Interpretation: Normal: 62-146%

**PROTEIN S ANTIGEN, TOTAL**  
**HEMATOLOGY**

Order as: Protein S Antigen, Total  
Patient Preparation: None  
Specimen Collection/minimum amount:  
1 Blue top tube (Hemogard plastic), with **exactly** 2.7 ml blood  
Stat: No  
Weekends/Holidays: Will accept specimen
Turnaround time: 72 hours (Reference Laboratory procedure)
Interpretation: Normal: 60 – 150%

PROTHROMBIN TIME (P.T.)

HEMATOLOGY

Order As: PT
Includes: PT and INR
Patient Preparation: None
Specimen Collection/minimum amount:
   **Exactly** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   **Invert to mix specimen with anticoagulant.**

**NOTE:** If drawn through a line, discard first cc of specimen.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normal: 11.9 – 14.4 seconds; INR 0-2
   Therapeutic: Standard dose INR 2-3
   Intense dose INR 2.5-3.5

PT. MIXING STUDY

HEMATOLOGY

Order As: PT Mixing Study
Patient Preparation: No coagulation therapy administered.
Specimen Collection/ minimum amount:
   **EXACTLY** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)
   **Invert to mix specimen with anticoagulant.**

**NOTE:** If drawn through a line, discard first cc of specimen
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: normal: 11.9 – 14.4 seconds

PTH (PARATHYROID HORMONE)

CHEMISTRY

Order As: PTH intact
Patient Preparation: None
Specimen Collection: Minimum Amount: 10 ml blood in gel barrier tube
Stat?: **ONLY** for intra-operative parathyroidectomy cases.
Weekends/Holidays: **Saturday only – do not collect specimen on Sunday or holiday!**
Turnaround Time: 24 hours
Interpretation: Intact Adult: 12–65 pg/ml; Pediatric (2-20 yr): 9-52 pg/ml
**aP.T.T. (PARTIAL THROMBOPLASTIN TIME)  HEMATOLOGY**

Order As: aPTT  
Patient Preparation:  
If heparin is being given, draw specimen 1 hour before next dose.  
Specimen Collection/Minimum Amount:  
**Exactly** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)  
**Invert to mix specimen with anticoagulant.**  
**NOTE:** If drawn through a line, discard first cc of specimen.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr.; Routine: 4 hrs  
Interpretation: Normal: 23.4 – 38.9 seconds

**P.T.T. MIXING STUDY  HEMATOLOGY**

Order as: PTT mixing study  
Patient Preparation: No coagulation therapy administered  
Specimen Collection/Minimum Amount:  
**Exactly** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)  
**Invert to mix specimen with anticoagulant.**  
**NOTE:** If drawn through a line, discard first cc of specimen  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr.; routine: 4 hrs.  
Interpretation: Normal: 25.0 – 38.8 seconds

**Q-FEVER ANTIBODY  MICROBIOLOGY**

Order as: Q-Fever Antibody  
Synonym: Coxiella burnetii Ab  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 7 days (Reference Lab Procedure)  
Interpretation: Normal: Negative = Less than 1:8

**QUINIDINE  CHEMISTRY**

Order As: Quinidine Level  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
5 ml blood in red top tube **without** serum separator.  
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 1 day (Reference Lab procedure)
Interpretation: Therapeutic: 2.0 - 5.0 ug/ml; Toxic: Greater than 6.0 ug/ml

RA FACTOR - See RHEUMATOID ARTHRITIS FACTOR

RAPID GROUP A STREP SCREEN MICROBIOLOGY

Order as: Strep A Screen
Patient Preparation: None
Specimen Collection:
  Throat specimen - Swab affected area with dual-swab culturette.
  NOTE: As per Pediatric and Adult ER protocols, a separate order should be submitted for possible additional confirmatory testing.
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: 1 hour
Interpretation: Normal: Negative

RAST SCREEN

Refer to: Allergy Testing Mixes and Single Allergens in Special Diagnostic Immunology Manual.

RENAL FUNCTION PANEL CHEMISTRY

Order as: Renal Function Panel
Includes: See Interpretation listing below
Patient Preparation: None
Specimen Collection, Minimum amount: 4 ml in gel barrier tube
Stat? No
Weekends/holidays? Yes
Interpretation: Normal:
  Glucose: 68 – 122 mg/dl (fasting)
  BUN: 5 - 24 mg/dl
  Creatinine: 0.3 – 1.5 mg/dl
  Sodium: 134 – 146 mEq/L
  Potassium: 3.5 – 5.2 mEq/L
  Chloride: 95 – 108 mEq/L
  CO2: 24 – 32 mEq/L
  Calcium: 8.4 – 10.2 mg/dl
  Phosphorus: 2.7 – 4.3 mg/dl
  Albumin: 3.5 – 5.6 gm/dl
**RENIN**

**CHEMISTRY**

Order as: Renin
Patient Preparation: Values affected by patient's position and diet.
Specimen Collection, Minimum Amount:

3 ml blood Lavender Top Tube. Keep at room temperature.

Invert to mix anticoagulant with specimen.

**DO NOT SEND THESE SPECIMENS THROUGH PNEUMATIC TUBE SYSTEM. TRANSPORT IMMEDIATELY TO LABORATORY BY COURIER.**

Stat?: No
Weekends/Holidays: No
Turnaround Time: 3-6 days (Reference Lab Procedure)
Interpretation: Supine: 0.15-2.33 ng/ml/hr; Upright: 1.31-3.95 ng/ml/hr

**REPTILASE TEST**

**HEMATOLOGY**

Order as: Reptilase
Patient preparation: None
Specimen collection/minimum amount:

Exactly 2.7 ml blood in a 5m Blue top Hemogard plastic tube. Invert to mix with anticoagulant.

Stat?: No
Weekends/Holidays: No
Turnaround time: 4 hours
Interpretation: 0-20 seconds

**RESPIRATORY PATHOGEN PANEL BY PCR**

**MICROBIOLOGY**

Order as: Respiratory Pathogen Panel By PCR
Synonym: RPP
Patient Preparation: None
Specimen Collection/Minimum Amount: One (1) nasopharyngeal swab submitted in Viral transport media

Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 Hours
Interpretation: Normal = Negative for all Analytes
**RETICULOCYTE COUNT**

Order as: Reticulocyte  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
1 ml blood in 5 ml Lavender top Hemogard tube  
Micro specimens: 400 lambda in lavender microtainer.  
**Invert to mix specimen with anticoagulant.**

Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 4 hrs.  
Interpretation: Normal: 0.3 - 1.8%

**RHEUMATOID ARTHRITIS FACTOR**

Order as: Rheumatoid factor  
Synonyms: R.A. Factor, Latex Fixation  
Patient Preparation: None  
Specimen Collection/minimum amount: 2 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: No  
Turnaround Time: Run daily Mon - Fri  
Interpretation: Negative: 0 - 30 I.U/ml

**RHOGAM**

Order As: Ordering blood components for administration/RhoGam  
Patient Preparation: None  
Specimen Collection: Purple-top tube.  
Label with (1) patient’s full name and medical record number or trauma number exactly as it appears on the Identaband, (2)date of specimen collection (also time if possible),and (3) circled signature of person who collected the specimen and a second verifying signature. This information may be written directly on the vacutainer tube label or on a Blood Bank specimen label (available from Blood Bank), taking care not to obscure the blank tube label beneath.  
**IMPORTANT: INCORRECTLY LABELED SPECIMENS WILL NOT BE ACCEPTED BY THE BLOOD BANK.**  
**Note:** Fetal cell screening test is to be ordered in conjunction with each RhoGam request.  
Minimum Amount: 5 ml blood into purple top tube
RIPA (Ritocetin-Induced Platelet Aggregation)  
**HEMATOLOGY**

Order as: RIPA  
Includes: Risocetin High and Risocetin Low  
Patient preparation: Schedule with Hematology (ext. 4885). No aspirin or aspirin-containing compounds for 7-10 days prior to testing.  
Specimen collection/minimum amount:  
4 Blue top tubes (Hemogard plastic), each with exactly 2.7 ml blood and 1 lavender Hemogard tube with at least 1 ml blood. Invert to mix specimens with anticoagulant.  
Stat? No  
Weekends/holidays: No  
Turnaround time: 24-48 hours  
Interpretation: Pathologist interpretation.

RISTOCETIN COFACTOR  
**HEMATOLOGY**

Order As: Ristocetin Cofactor  
Patient Preparation: None  
Specimen Collection/minimum amount:  
**Exactly** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)  
**Invert to mix specimen with anticoagulant.**  
Stat? No  
Weekends/Holidays: No  
Turnaround Time: 4 hours  
Interpretation: Normal: Greater than 40%

ROCKY MOUNTAIN SPOTTED FEVER ANTIBODY  
**MICROBIOLOGY**

Order As: Rickettsial Ab Panel  
Synonyms: Rickettsialpox titer; *Rickettsia rickettsii* titer, RMSF titer  
Includes: *Rickettsia rickettsii* titer IgG, Rocky Mt. Spotted fever titer IgG/IgM  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube  
Stat? No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 7 days (reference lab procedure)  
Interpretation: Normal: Negative: Less than 1:16

R.P.R. (RAPID PLASMA REAGIN) – for syphilis testing  
**CHEMISTRY**
Order As: RPR
Synonym: STS, ART
Patient Preparation: None
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube
Stat?: Yes - Only on patients in labor who have no previous syphilis serology test on record, and newborns as indicated. Chemistry must be notified at ext. 4862 for this stat priority to be recognized.
Weekends/Holidays: Yes, if ordered stat.
Turnaround Time: **Stat:** 1 hour; **Routine:** Same day if specimen is received before 10AM.
Interpretation: Normal: Non-reactive. **If positive, the specimen will be sent for outside confirmation**

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**SALICYLATE LEVEL**

CHEMISTRY

Order As: Salicylates
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in red top tube
Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hr.; Routine: 4 hours
Interpretation: Therapeutic range: Less than 20 mg/dl

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**SEDIMENTATION RATE**

HEMATOLOGY

Order As: Sedimentation Rate
Synonyms: ESR, Sed Rate, Erythrocyte Sedimentation Rate
Patient Preparation: None
Specimen Collection/minimum amount:
2 ml blood in 5 ml Lavender top Hemogard tube
**Invert to mix specimen with anticoagulant.**
Stat?: No
Weekends/Holidays: Yes.
Turnaround Time: 4 hours
Interpretation: Normal: Male: 0-10 mm/hr; Female: 0-15 mm/hr
**Note:** Result can increase with age; not corrected for anemia. Call Hematology (x 4885) with questions.

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**SEROTONIN (WHOLE BLOOD or SERUM)**

CHEMISTRY

Order As: Serotonin (blood)
Patient Preparation: None
Specimen Collection: Minimum Amount:
10 ml blood in lavender top tube or plain red top.
**Invert to mix anticoagulant with specimen.**
Serotonin (5-HIAA) CHEMISTRY

Order as: Serotonin - 5 - HIAA (24 hr urine)
Patient Preparation: Patient should exclude the following foods and drugs for at least 24 hrs prior to specimen collection:
  1) Foods: bananas and avocados
  2) Drugs: aspirin, phenacetin, acetanilide, nephensin and phenothiazine
Specimen Collection: Minimum Amount: 24 hr urine collection.
  No preservative required; refrigerate.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 72 hours (Reference Lab Procedure)
Interpretation: Normal: 0 – 14.9 mg/24 hrs.

--------------------------------------------------

Serum Protein Electrophoresis - See Protein Electrophoresis (serum)

--------------------------------------------------

Sex Hormone Binding Globulin CHEMISTRY

Order As: Testosterone binding capacity
Synonym: SHBG, TeBG, Testosterone binding globulin
Patient Preparation: None
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Normal:
  Male: 14.5 – 484 nmol/L
  Female: (17 – 50 years) 26.1 – 110.0 nmol/L
  (50 years +) 14.1 – 68.9 nmol/L

--------------------------------------------------

Sickle Cell Prep HEMATOLOGY

Order As: Sickle Cell Prep
Patient Preparation: None
Specimen Collection/minimum amount:
  1 ml blood in 5 ml Lavender top Hemogard tube
  Micro specimens: 400 lambda blood in lavender microtainer.
  Invert to mix specimen with anticoagulant.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 4 hours
Interpretation: Normal: Negative. If a positive test is obtained on an unknown sickle patient, a hemoglobin electrophoresis will be performed for confirmation.

SINEQUON LEVEL - See DOXEPIN

SIROLIMUS

Order as: Sirolimus
Patient preparation: None
Specimen collection/min amount: 3 ml blood in Lavender top tube
Stat? No
Weekends/holidays: Yes
Turnaround Time: 24 hours (Day Shift only)
Interpretation: 9 - 18 ng/ml

SMEAR, GENERAL BACTERIAL (GRAM STAIN): See Microbiology Section D

SODIUM (Serum)

Order As: Sodium
Synonym: Na+
Patient Preparation: None
Specimen Collection: Minimum Amount:
  1) 3 ml blood in gel barrier tube
  2) Gold top microtainer with serum separator - 1/2 full
Stat?: Yes
Weekends/Holidays: Yes
Turnaround: Stat: 1 hr; Routine: 4 hours
Interpretation: Normal: 134-146 mEq/L

SODIUM (Urine)

Order As: Sodium (24 hr urine) or Sodium (random urine), as applicable
Patient Preparation: None
Specimen Collection: Minimum Amount: Random urine or 24 hour urine. Collection dependent on ordering physician.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 4 hours
Interpretation: Normals: 24 hour urine: 50-250mEq/24 hrs; Random urine: N/A
SPECIFIC GRAVITY BY REFRACTOMETER  POINT-OF-CARE TEST SITES

Performed on authorized nursing units only: PICU, Pediatric Oncology, Pediatrics, and Reuten Clinic.
Patient preparation: Identify patient by 2 identifiers as per HUMC policy.
Specimen collection: Collect and analyze freshly voided urine. A specimen that is allowed to stand can result in an inaccurate reading.
Performing test: Refer to test procedure in unit’s Point-of-Care Testing Manual.
Interpretation: 1.005 – 1.025 (varies with fluid intake). Refer to unit-specific protocol.

STREP SCREEN  -  See RAPID GROUP A STREP SCREEN

S.T.S. (Serological Test for Syphilis, Serum)  -  See RPR

SWEAT TEST (IONTOPHORESIS)  CHEMISTRY

Order As: Sweat Test (Sweat Chloride)
Patient Preparation:
Must be scheduled with Chemistry Section ext. 4862 (201-996-4862)
Specimen Collection: Performed by Laboratory
Minimum Amount: 100 mg. sweat
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hours
Interpretation (revised 3/2012 per CF Foundation recommendations):

<table>
<thead>
<tr>
<th>Age</th>
<th>Sweat Cl (meq/L)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 months</td>
<td>&lt;=29</td>
<td>CF Unlikely</td>
</tr>
<tr>
<td>30-59</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td>&gt;=60</td>
<td>Indicative of CF</td>
<td></td>
</tr>
<tr>
<td>Over 6 months</td>
<td>&lt;40</td>
<td>CF Unlikely</td>
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<tr>
<td></td>
<td>40-59</td>
<td>Intermediate</td>
</tr>
<tr>
<td></td>
<td>&gt;60</td>
<td>Indicative of CF</td>
</tr>
</tbody>
</table>

SYPHILIS TESTING  -  See RPR for serum.  See VDRL for CSF

T3 FREE  CHEMISTRY
Order As: T3 Free
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 2.0 – 3.7 pg/ml

-----------------------------------

T3 TOTAL
CHEMISTRY

Order As: T3 Total
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: .70 - 2.10 ng/ml

-----------------------------------

T3 UPTAKE
CHEMISTRY

Order As: T3 Uptake
Patient Preparation: None
Specimen Collection/Minimum Amount: 1 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 24-36%

-----------------------------------

T4 FREE
CHEMISTRY

Order As: T4 Free
Patient Preparation: None
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: 0.76 - 1.79 ng/dl

-----------------------------------

T4 TOTAL
CHEMISTRY

Order As: T4 Total
Synonym: Thyroxine
Patient Preparation: None
Specimen Collection: Minimum Amount:
1) 1 ml blood in gel barrier tube
2) Gold top microtainer with serum separator.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Normal: 4-14 ug/dl

---------------------------------------

**TACROLIMUS**

Order as: Tacrolimus
Synonym: Prograf
Patient Preparation: None
Specimen Collection/min amount: 1 ml blood in lavender top tube
Stat?: No
Weekends/Holidays: Yes
Run daily 7AM-2PM.
Requests after 2PM will be processed the following day
Turnaround Time: 1 day, maximum 2 days
Interpretation: 5.0-15.0 ng/ml

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**T.B. CULTURES (AFB)** - See Microbiology Section G

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**TEGRETOL** - See CARBAMAZEPINE

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**TESTOSTERONE**

Order As: Testosterone
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes.
Turnaround Time: 24 hours (test run on DAY SHIFT only)
Interpretation: Normal: Male (Adult): 241 - 827 ng/dl
Female (Adult): 14 – 76 ng/dl

---------------------------------------

**TESTOSTERONE BINDING GLOBULIN** -

See SEX HORMONE BINDING GLOBULIN
**TETANUS ANTIBODY**

Order As: Tetanus Antibody  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 5 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 7 days (reference lab procedure)  
Interpretation: Protective: >0.1 ug/ml  
Non-protective: <0.1 ug/ml

**THEOPHYLLINE LEVEL**

Order As: Theophylline  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in red top tube  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 1 day  
Interpretation: Therapeutic: 10-20 ug/ml

**THROMBIN TIME**

Order As: Thrombin Time  
Patient Preparation: None  
Specimen Collection/Minimum Amount:  
  **Exactly** 2.7 ml blood in 5 ml Blue top tube (Hemogard plastic)  
  Invert to mix specimen with anticoagulant.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 4 hours  
Interpretation: Normal: 15.3 – 20.6 seconds

**THYROID BINDING GLOBULIN (TBG)**

Order As: TBG  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in red top tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 1 - 4 days (reference lab procedure)  
Interpretation: Normal:  
  Males: 12-26 mcg/ml  
  Females: 11-27mcg/ml
THYROID STIMULATING IMMUNOGLOBULINS  

Order As: Thyroid Stimulating Immunoglobulins  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 0.5 ml blood in red top tube  
Stat?: No  
Weekends/Holidays: Will accept specimen.  
Turnaround Time: 1 week (reference lab procedure)  
Interpretation: Normal: < or = 1.3 TSI index

THYROXINE – See T4 TOTAL

TISSUE TRANSGLUTAMINASE IgA or IgG

Order as: tTG IgA or tTG IgG  
Synonym: tTG  
Patient preparation: None  
Specimen collection: Blood: 1 red top tube  
Stat? No  
Weekends/holidays: Will accept specimen  
Turnaround time: 4 days (Reference Lab procedure)  
Interpretation: tTG IgA: < 4.0 units/ml  
tTG IgG: < 6.0 units/ml

TOBRAMYCIN

Order As: Tobramycin peak, trough or random as applicable  
Patient Preparation: Patient must be receiving the aminoglycoside  
Specimen Collection/minimum amount: 5 ml blood in Red top tube  
1) Peak level:  
   Drug given IM - Draw blood 1 hour after injection  
   Drug given IV - Draw blood at end of infusion  
2) Trough Level:  
   Draw blood just prior to administration of next dose.  
   Note: Patient should be on tobramycin for 24 hours before a trough level is drawn.  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hour; Routine: 24 hours  
Interpretation: Therapeutic Tobramycin levels:  
random: 1-10 ug/ml  
peak: 5-10 ug/ml  
trough: Less than 2 ug/ml
TOFRANIL - See IMIPRAMINE

TOTAL COMPLEMENT - See COMPLEMENT, TOTAL

TOXOPLASMA ANTIBODY (CSF) MICROBIOLOGY

Order As: Toxoplasma IgG (CSF) or IgM (CSF) as applicable
Patient Preparation: None
Specimen Collection: Minimum Amount: 1 ml CSF
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 7-10 days (reference lab procedure)
Interpretation: See reference report

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TOXOPLASMA – IgG or IgM CHEMISTRY

Order As: Toxoplasma IgG, Toxoplasma IgM as applicable
Synonym: Toxo titer IgG, Toxo IgM
Patient Preparation: None
Specimen Collection: Minimum Amount: 2 ml blood in red top tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (Reference Lab test)
Interpretation:
  IgG: negative: < or = 9.0 IU/ml
  IgM: negative: < 0.55 IU/ml

---

TRANSFERRIN CHEMISTRY

Order As: Transferrin Level
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: Test performed daily Mon - Fri
Interpretation: 205-306 mg/dl

---

TRICHINELLA ANTIBODY MICROBIOLOGY

Order as: Trichinella Antibody
Patient Preparation: None
Specimen collection/minimum amount: 5 ml of blood in gel barrier tube.
Stat? No
Weekends/Holidays: Will accept specimen  
Turnaround Time: 7 days (reference lab procedure)  
Interpretation: Normal: Negative for Trichinella Antibody

--------------------------------------------

**TRICHOMONAS VAGINALIS PREP** - See Microbiology Section L

--------------------------------------------

**TRIGLYCERIDES**

Order As: Triglycerides  
Patient Preparation: Fasting for 12 hours  
Specimen Collection/Minimum Amount: 2 ml blood in gel barrier tube  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 1 day  
Interpretation: Normal: 60-160mg/dl

NOTE: The ordering physician/hospital service will be notified of a triglyceride level equal to or greater than 200 mg/dl on patients from birth to 1 year of age ONLY.

--------------------------------------------

**TRILEPTAL**

Order as: Trileptal  
Synonym: Oxcarbazepine  
Patient Preparation: None  
Specimen Collection/Minimum Amount: 3 ml blood in a red top tube  
Stat? No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 3 days (Reference Lab procedure)  
Interpretation: 3 – 35 mcg/ml

--------------------------------------------

**TROPONIN I**

Order as: Troponin I  
Patient Preparation: None  
Specimen collection/minimum amount: 4 ml blood in gel barrier tube  
Stat: Yes  
Weekends/Holidays: Yes  
Turnaround time: Stat: 1 hr; Routine: 4 hrs.  
Interpretation:  
    Negative: less than 0.4 ng/ml  
    Diagnostic cutoff for acute myocardial infarction (as defined by WHO criteria): Equal or greater than 0.40 ng/ml

--------------------------------------------
**TSH (Thyroid Stimulating Hormone)**

**CHEMISTRY**

Order As: TSH  
Patient Preparation: None  
Specimen Collection: Minimum Amount:  
1) 2 ml blood in gel barrier tube  
2) Gold top microtainer with serum separator - FILLED  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hrs  
Interpretation: Euthyroid: 0.5 - 5.0 uIU/ml  
Up to one week old: 3.5 - 21.4 uIU/ml

**TYLENOL** - See ACETAMINOPHEN

**TZANCK PREP** - See Cytology, Section E

**UREA - URINE**

**CHEMISTRY**

Order As: Urea (24 hr urine)  
Patient Preparation: None  
Specimen Collection, Minimum Amount:  
24 hour urine with no preservative. Refrigerate.  
Stat?: No  
Weekends/Holidays: Yes  
Turnaround Time: 24 hours  
Interpretation: Normal: 12,000 - 20,000 mg/24hrs

**URIC ACID (Serum)**

**CHEMISTRY**

Order As: Uric Acid  
Patient Preparation: None  
Specimen Collection: Minimum Amount:  
1) 1 ml blood in gel barrier tube or  
2) Gold top microtainer with serum separator - 1/2 full  
3) Lithium Heparin  
Stat?: Yes  
Weekends/Holidays: Yes  
Turnaround Time: Stat: 1 hr.; Routine: 4 hours  
Interpretation: Normal: 2.5 - 7.6 mg/dl

**URIC ACID (24 hour urine)**

**CHEMISTRY**
Order As: Uric Acid (24 hour urine)
Patient Preparation: None
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 24 hours
Interpretation: Normal: 250-750 mg/24 hrs.

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URINALYSIS, STANDARD

Order As: Urinalysis
NOTE: If Microscopic examination is also desired, order “Urinalysis with Microscopic”. Otherwise a microscopic exam will only be performed if the specimen meets the criteria listed below under Interpretation.
Patient Preparation: None
Specimen Collection/minimum amount:
Approximately 25 ml in a Urine Complete Cup Kit, which is orderable from Distribution (PeopleSoft # 5104232). This kit contains a specimen cup with integrated transfer port and 2 vacutainer tubes: a gray top for Culture and Sensitivity (C&S) and a red/marble top for routine UA. Both tubes contain preservatives to maintain specimen integrity. Fill both tubes from the cup to between the Minimum (Min) and Maximum (Max) lines on the tubes, however, only the ordered tests will be performed unless otherwise indicated. Dispose of the Blue cup LID ONLY in a sharps container on the unit. Send only the tubes to the Lab - Do not send the cup.
NOTES:
(1) ANY URINE PROCEDURE OTHER THAN A ROUTINE UA OR C&S SHOULD BE SENT IN A STERILE SPECIMEN CUP (PeopleSoft # 854000) or AN UNPRESERVED URINE VACUTAINER TUBE (PeopleSoft # 5104233). Both are orderable from Distribution. For any other urine chemistry procedures, refer to the specific listing in this manual or call Chemistry at x 4862.
(2) While urine preservative collection devices are preferable, Chemistry will accept approximately 15 ml random urine in a specimen cup for a routine Urinalysis.

Stat?: Yes
Weekends/Holidays: Yes
Turnaround Time: Stat: 1 hour; Routine: 4 hours
Interpretation: Normals:
   Color – Yellow
   Appearance - Clear
   pH - 4.5 - 8.0
   Specific Gravity (Sp. Gr.) - 1.005 - 1.025
   Protein - Negative
   Reducing Substance - Negative
   Glucose - Negative
   Ketones - Negative
   Bilirubin - Negative
Blood - Negative
Leukocyte esterase - Negative
Nitrite - Negative
Urobilinogen - 0.2 - 1.0 E.U.

NOTE: A microscopic analysis will be performed by specific request or if any of the following are positive: blood, leukocyte esterase, nitrite, protein, or appearance other than clear.

WBC/HPF: 0-5
RBC/HPF: 0-3
Bacteria: None/few
Epithelial: 0-4/HPF
Crystals: Amorphous, few calcium oxalate
Casts: Hyaline 0-1/LPF; others – none
Mucous: Not significant

Revised: 7/2014

UROBILINOGEN (Stool) CHEMISTRY

Order As: Urobilinogen (Stool)
Patient Preparation: None
Specimen Collection: Random Stool
Stat?: No
Weekends/Holidays: No
Turnaround Time: 24 hours
Interpretation: Normal: Positive

VALIUM - See DIAZEPAM

VALPROIC ACID CHEMISTRY

Order As: Depakene
Patient Preparation: None
Specimen Collection/Minimum Amount: 3 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: Therapeutic range - 50.0 - 100.0 ug/ml

VANCOMYCIN CHEMISTRY

Order As: Vancomycin Peak, Random, or Trough as applicable.
Patient Preparation: Patient must be receiving this drug therapy.
Specimen Collection/Minimum Amount: 3 ml blood in red top tube (revised 3/30/11)
1. Peak Level
(a) Drug given I.M. - Blood drawn 1 hr after injection
(b) Drug given I.V. - Blood drawn at the end of infusion

2. **Trough Level** - Blood drawn just prior to administration of next dosage of Vancomycin. Patient should have been on the drug for 24 hours before a trough level is drawn.

  Stat?: Yes
  Weekends/Holidays: Yes
  Turnaround Time: Stat: 1 hour; Routine: 24 hours
  Interpretation: Vancomycin Therapeutic serum levels:
  Peak: 30 - 40 mcg/ml;
  Trough: 10-19.9 mcg/ml

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**V.D.R.L. (CSF ONLY)**

NOTE: For serum specimens see STS

Order As: VDRL (CSF)

Patient Preparation: None

Specimen Collection: Minimum Amount: 0.5 ml of CSF

Stat?: No

Weekends/Holidays: Will accept specimen

Turnaround Time: 3 days (Batched test)

Interpretation: Normal: Non-reactive

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**VIDAS D-DIMER**

Order as: D-Dimer. Test will reflex to Vidas D-Dimer for ETD patients ONLY.

Patient Preparation: None

Specimen Collection: minimum amount: 2.7 ml blood in a 5 ml Blue top tube.

  NOTE: **invert** to mix anticoagulant with specimen

Stat?: Yes

Weekends/Holidays: Yes

Turnaround Time: 1 hour

Interpretation: Normal: 0.0 – 499 FEU ng/ml

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**VIROLOGY PROCEDURES**

See Virology Procedure Manual or Call Virology Lab at ext. 4945.

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**VISCOSITY (Serum)**

Order As: Viscosity

Patient Preparation: None

Specimen Collection, Minimum Amount: 2 gel barrier tubes totaling 10 ml blood
NOTE: Tube must be FULL.
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 24 hours
Interpretation: 1.2 - 1.8

VITAMIN A CHEMISTRY
Order As: Vitamin A
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in red top tube (rev. 6/2012).
Wrap immediately in aluminum foil.
Stat?: No
Weekends/Holidays: No
Turnaround Time: 5 days (reference lab procedure)
Interpretation: Normal:
0-6 years: 11.3-64.7 mcg/dl
7-12 years: 12.8-81.2 mcg/dl
13-17 years: 14.4-97.7 mcg/dl
≥18 years: 32.5-78.0 mcg/dl

VITAMIN B12 CHEMISTRY
Order As: Vitamin B12
Patient Preparation: None
Specimen Collection: Minimum Amount: 5 ml blood in gel barrier tube
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Normal: 211-911 pg/ml

VITAMIN C CHEMISTRY
Order As: Vitamin C
Patient Preparation: None
Specimen Collection: Minimum Amount: 5 ml blood in gel barrier tube, drawn on ice and protected from light
Stat?: No
Weekends/Holidays: Yes
Turnaround Time: 3-5 days (reference lab procedure)
Interpretation: Normal: 0.4 – 2.0 mg/dl

VITAMIN D, 25 – HYDROXY CHEMISTRY
Order as: Vitamin D 25 hydroxy
Synonym: Vitamin D3 metabolite; Cholecalciferol metabolite
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in gel barrier tube
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3-5 days (Reference Lab Procedure)
Interpretation: Normal: 32 – 100 ng/ml

VITAMIN D, 1,25 – DIHYDROXY

Order as: Vitamin D 1,25 dihydroxy
Synonym: Calcitriol; 1,25-Dihydoroxy Vitamin D3
Patient Preparation: None
Specimen Collection: Minimum Amount: 3 ml blood in gel barrier tube
Stat? No
Weekends/Holidays: Will accept specimen
Turnaround Time: 3-5 days (Reference Lab Procedure)
Interpretation: Normal:
   Males: <16 years: 24-86 pg/ml; ≥16 years: 18-64 pg/ml
   Females: <16 years: 24-86 pg/ml; ≥16: 18-78 pg/ml

V.M.A. (VANILLYLMANDELIC ACID)

Order As: VMA (24 hr urine)
Patient Preparation: Patient's diet must exclude the following foods and drugs from 72 hours before through completion of test:
   Foods: Caffeine (Coffee, tea), chocolate, fruit, foods containing vanilla
   Drugs: Aspirin, phenothiazine, anti-hypertensive drugs
Specimen Collection: Minimum Amount: 24 hour urine collection with 50% acetic acid added to the specimen container prior to collection. Contact Chemistry Section x 4862. HANDLE CONTAINER CAREFULLY.
Stat?: No
Weekends/Holidays: Will accept specimen
Turnaround Time: 4 days (reference lab procedure)
Interpretation: Normal:
   <1 year: <27.0 mg/g creatinine
   1 year: < 18.0 mg/g creatinine
   2-4 years: < 13.0 mg/g creatinine
   5-9 years: < 8.5 mg/g creatinine
   10-14 years: < 7.0 mg/g creatinine
>15 years (adults): <8.0 mg/24 hours

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**VON WILLEBRAND FACTOR ANTIGEN**  
**HEMATOLOGY**

Order As: Von Willebrand Factor Antigen  
Patient preparation: None  
Specimen Collection: Minimum Amount:  
**Exactly** 2.7 ml in a 5 ml Blue top tube (Hemogard plastic)  
**Invert to mix anticoagulant with specimen.**  
**Transport to the Hematology Section immediately.**  
Stat?: No  
Weekends/Holidays: Will accept specimen  
Turnaround Time: 24 hours  
Interpretation: Normal: 50 - 160%

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**WHITE BLOOD CELL SMEAR (Stool, Urine, Nasal)**  
**HEMATOLOGY**

Order As: WBC Smear (Stool), WBC Smear (Urine) or WBC (Nasal) as applicable  
Patient Preparation: None  
Specimen Collection:  
1. Glass slide(s) prepared from nasal swab labeled with patient's name. Be sure to keep slides separated in transport to prevent specimen from being wiped off onto the other slide.  
2. Urine or stool specimen  
Minimum Amount: 1-2 slides  
Stat?: No  
Weekends/Holidays: No  
Turnaround Time: 4 hours  
Interpretation: Negative for WBC’s

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**WHITE BLOOD COUNT (WBC)**

May be ordered individually or as part of a CBC. Same protocol as CBC.

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**XYLOSE - See D-XYLOSE**

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**ZARONTIN**  
**CHEMISTRY**

Order As: Zarontin  
Synonym: Ethosuximide  
Patient Preparation: None
Specimen Collection: Minimum Amount:
   1 ml blood in red top tube **without** serum separator.
Stat? No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 1 day (reference lab procedure)
Interpretation: Therapeutic: 40-100 ug/ml; Toxic: > 100 ug/ml

ZINC LEVEL

Order As: Zinc level (blood)
Patient Preparation: None
Specimen Collection: Minimum Amount:
   Blood: 1 **Royal Blue**-top tube
      **Must not be in contact with rubber stoppers.**
Stat?: No
Weekends/Holidays: Will accept specimen.
Turnaround Time: 3 days (reference lab procedure)
Interpretation: Normal: 0 – 10 years: 0.60 – 1.20 mcg/ml ; >11 years: 0.66 – 1.10 mcg/ml