Clinical Laboratory Division Specific Procedures

Chemistry

I. GENERAL INFORMATION

A. Laboratory Hours:

Routine Hours: Monday – Friday, 8 am to 5 pm
Emergency (STAT) Service: 24 hours/7 days.

B. Telephone Numbers:

Clinical Chemistry - Information and Results - 206-8590
(Includes Drug Monitoring, Endocrinology, Flow Cytometry, Immunology, and Toxicology)

II. TEST CONSULTATION AND APPROVAL

Some clinical Chemistry tests are performed ONLY after consultation with a Laboratory Medicine Resident. See the Alphabetical List of Tests for further information. A Laboratory Medicine Resident is available at all times for consultation regarding clinical Chemistry problems.

Monday - Friday, 8 am through 5 pm - 206-5527, or pager number (415) 443-2311.

At all other times, call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590, and request their assistance to contact the Lab Medicine Resident on call.

Hematology

I. GENERAL INFORMATION

A. Hematology Laboratory Hours:

Routine Hours: Monday-Friday, 8 am- 5 pm
Emergency (STAT) Service: 24 hours/7 days

B. Telephone Numbers:

Hematology – Information and Results 206-8590

II. TEST CONSULTATION AND APPROVAL

Some hematology tests are performed ONLY after consultation with a Laboratory Medicine Resident. See the Alphabetical List of Tests for further information. A Laboratory Medicine Resident is available at all times for hematology and coagulation problems:

Monday-Friday 8 am - 5 pm,
pager (415) 443-0179

At all other times, call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590, and request their assistance to contact the Lab Medicine Resident on call.

Coagulation

I. GENERAL INFORMATION

1. Coagulation Hours:

Main Laboratory (2M): Monday-Friday, 8:00 am-5:00 pm
Emergency (STAT) Service: 24 hours/7 days

2. Telephone numbers:

Hematology – Information and Results: 415-206-8590

II. TEST CONSULTATION AND APPROVAL

Some coagulation tests are performed ONLY after consultation with a Laboratory Medicine Resident. See the Alphabetical List of Tests for further information. A Laboratory Medicine Resident is available at all times for coagulation and bleeding problems:

- Monday – Friday, 8 am to 5 pm; pager number: 415-443-0179.

At all other times, call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590, and request their assistance to contact the Lab Medicine Resident on call.

BLOOD COLLECTION TUBES USED

Color of Cap	**Whole Blood Drawn**	**Contents and Use Capability**
Light Blue	2.7 mL	0.3 mL of 3.2% (109 mM) buffered sodium citrate, used for all coagulation tests requiring citrated plasma.
Light Blue	1.8 mL	0.2 mL of 3.2% (109 mM) buffered sodium citrate; use when smaller amount of blood is drawn.

COMMENTS ON COLLECTING COAGULATION SPECIMENS

1. DO NOT DRAW from heparinized intravenous or arterial lines. Heparin affects all coagulation results.

2. Tissue thromboplastin released during the venipuncture is a powerful activator of the clotting system and should not be allowed to contaminate any coagulation specimen. It is therefore important to do a clean venipuncture.

3. When multiple blood tubes are collected, the order of collection is important. Tubes for coagulation studies (blue top) should be drawn **before** serum tubes (red top), because the clot activator in plastic serum tubes may cause interference in coagulation testing. **Glass tubes** that do not contain any additives (also red top) may be drawn before the coagulation tube.

4. One full tube is sufficient for DIC work-up, i.e., Prothrombin Time (PT), Activated Partial Thromboplastin Time (APTT), Fibrinogen, and Fibrin D-Dimer (FDD). One tube is also sufficient for one or two factor assays. For inhibitor screens or complete factor work-up, **draw two full tubes**.

5. Buffered sodium citrate chelates calcium to anticoagulate the blood and maintains the proper plasma pH. Centrifugation takes away platelet phospholipids from the plasma. Thus, each clotting test has to add back standard amounts of calcium and phospholipids to resume the clotting process in a controlled test environment.

6. The ratio of blood to anticoagulant is ideally maintained at 9:1, or 2.7 mL blood to 0.3 mL sodium citrate in a light blue top tube (1.8 mL blood to 0.2 mL sodium citrate in the smaller light blue top tube). This ratio is based on a normal hematocrit of 45%. A short sample (less than 2.7 mL or, for the smaller light blue top tube, less than 1.8 mL) or high hematocrit (greater than 55%) will result in an excess of anticoagulant, thereby prolonging results.

   A correction formula and nomogram have been developed that allow adjustment of the citrate anticoagulant volume to compensate for higher than normal hematocrit values (CLSI Document H21-A5, Wayne, PA: Clinical Laboratory Standards Institute, 2008).

   The Laboratory stocks specially prepared collection tubes in which the citrate volume has been reduced to achieve more accurate coagulation testing in patients with hematocrit values from 56 to 70%. These **special** blue top tubes are available at the Nursery (6H). Each tube contains 0.17 mL of sodium citrate and should be filled only up to the black line (2.25 mL of whole blood).

   NOTE: THIS TUBE HAS NO VACUUM, so blood should be collected with a syringe then transferred into the tube up to the black line.

   An adjustment has also been suggested when the patient's hematocrit is below 20%. However, there is not enough data to document a significant difference if the adjustment is not made. Of prime consideration here is the increased risk of the specimen clotting, since there is less anticoagulant in relation to the patient's increased plasma volume.

7. Under-filling blue top tubes can prolong both PT and APTT. If the tube is filled less than 2.7 mL (or less than 1.8 mL in the case of the smaller blue top tubes) a long PT or APTT can become significantly longer than the true value. A normal PT or APTT result, however, may be only slightly longer than the true value.

As the impact of under-filling on coagulation studies is difficult to predict, under-filled tubes will not be accepted for testing.

8. Send the specimen to the Clinical Laboratory immediately. Ideally, specimens for coagulation should be received and processed within one hour of collection. This is especially important for assessment of anticoagulation with unfractionated heparin. See Prothrombin Time (PT), Partial Prothrombin Time, activated (APTT), Fibrinogen, and Factor Assays for test-specific information on specimen stability.

Toxicology

A. Requesting Toxicology Tests

Some toxicology tests are performed **only** after consultation with a Clinical Chemistry/Toxicology Fellow or Lab Medicine Resident (See the Alphabetical List of Tests for further information). A Clinical Chemistry/Toxicology Fellow is available Monday - Friday, 9 am - 5 pm; call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590 to contact the Fellow on call for consultation regarding toxicology problems. On evenings, weekends and holidays, call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590, and request their assistance to contact the Lab Medicine Resident on call.

Serum Testing

The Clinical Laboratory provides quantitative testing of serum for acetaminophen, carbamazepine, digoxin, ethylene glycol, gentamicin, lithium, methanol, phenobarbital, phenytoin, salicylates, tobramycin, valproic acid and vancomycin. STAT service is available 24 hours/day, 7 days/week except for methanol and ethylene glycol (8 am to 11 pm Mon to Fri and 8 am to 4 pm on Sat/Sun). See the appropriate listings in the Alphabetical List of Tests and the Table of Therapeutic/Toxic Ranges below for further details. The ZSFG Clinical Laboratory does NOT screen serum for unknown drugs.

Urine Testing

To screen for unknown drugs, the only specimen type tested at the ZSFG Clinical Laboratory is urine. Most drugs are present in higher concentrations and for a longer time in urine than in serum. With few exceptions, urine testing is more sensitive than serum for this purpose. If a patient has no urine output and serum testing is the only option, the specimen must be sent to a referral laboratory with a minimum turn-around time of 3-5 days and limited drug menu/sensitivity. Serum toxicology screening must be approved by the Clinical Chemistry Laboratory Medicine Resident (415-206-5527, pager 415-443-2311).

Microbiology

I. GENERAL INFORMATION AND DESCRIPTION OF SERVICES

A. Microbiology Laboratory Hours:

Routine Hours:	Monday - Friday, 8 am - 5 pm
Emergency (STAT) Service:	24 hours, 7 days

B. Telephone Numbers:

Microbiology - Information and Results: 415-206-8576

C. Antimicrobial Susceptibility Studies (ZSFG Antibiogram)

II. TEST CONSULTATION AND APPROVAL

Some microbiology tests are performed ONLY after consultation with a Laboratory Medicine Resident. See ALPHABETICAL LIST OF TESTS for further information. A Laboratory Medicine Resident is also available for consultation regarding microbiology problems.

- Monday - Friday, 8 am - 5 pm, 415-206-5699, or pager number 415-443-1438

At all other times, call the Clinical Laboratory Information Section (Inquiry) at 415-206-8590, and request their assistance to contact the Lab Medicine Resident on call.

1. Antigen detection in CSF, Urine, and other body fluids, see Antigen Detection in Body Fluids in the Alphabetical Tests
2. *Bordetella pertussis* PCR
3. CMV IgM
4. CMV Detection in Blood or Bone Marrow (PCR)
5. CSF-PCR tests
6. Histoplasma Antigen, Urine
7. Legionella Urine Antigen
8. Lyme Disease Serology
9. *Pneumocystis* Diagnosis: Use Chest Service Requisition to obtain these services. The Chest Service Fellow collects bronchoalveolar lavage or transbronchial biopsies via bronchoscopy and coordinates with the Microbiology Laboratory. Tracheal or bronchial aspirates are accepted only from patients who are intubated.
10. Release antimicrobial susceptibility test results not routinely reported.
11. Rotavirus Antigen
12. Rubella Virus Isolation
13. Serum Killing Level (SKL), Serum Cidal Test or Serum Antibacterial Titers, see Antimicrobial Serum Killing level.
14. Syphilis - *Treponema pallidum*, Darkfield.
15. Toxoplasma IgM
16. Susceptibility: Non-routine tests – fungal, viral, AFB, tube dilution antimicrobial susceptibility tests, time kill curve, killing rate by antimicrobial, combined antimicrobial activity and synergy tests, see Antimicrobial Susceptibility.
17. Touch Preparation (Impression Smear). This exam is useful for finding parasites (e.g., toxoplasma) and fungi in tissue. Notify Microbiology Resident when biopsies of brain, lung or other tissues are scheduled. Place biopsy on moist Telfa and transport to lab as soon as possible. **Do Not Fix Tissue or Float in Saline** for this exam.

III. MICROBIOLOGY REQUISITIONS AND SPECIMEN COLLECTION

A. In order to ensure proper selection of media and techniques, designate suspected organisms and diagnoses whenever possible. **All specimens**, whether in collection container or inoculated to culture media, **must be labeled with the patient's complete name, medical record number, and date and time of collection. All** specimens must be placed in a biohazard bag; place the requisition (for Outpatients) in the outer pouch. Do not put the requisition inside the biohazard bag.

B. Specific specimen collection instructions appear under each procedure entry.

1. Do not send specimens such as pus, exudates, fluids, tissues, or catheter tips in Transport Medium because they become buried and lost. Do not send specimens in a syringe with needle attached. Send these specimens in a sterile, screw-top tube.

2. Swab-collected specimens should be put into Transport Medium before sending them to the laboratory. **Swab collected specimens are not satisfactory for culture of anaerobes or AFB**. See instructions for special anaerobic culture below. For large volume collections, large volume, sterile, evacuated bottles are available from the Pharmacy.

   Bone marrow for bacterial, mycology or AFB culture should be drawn into a bright green top (heparin) tube.

   Bone marrow for detection of viruses by PCR must be drawn into lavender top (EDTA) tube

3. Anaerobic Bacteria Culture Collection

   Collect specimens for anaerobic culture in carbon dioxide-filled anaerobic collection tube. Call Lab Support Services 415-206-8199 to restock these tubes.

   a. Procedures for Specimen Collection

Site	**Specimens & Method of Collection**
Dental/Sinuses	Aspirated or biopsy material
Pulmonary area	Needle aspiration of an abscess or biopsy
Abdominal area	Paracentesis fluid, or aspiration of deep abscess by needle and syringe
Female genital tract	Laparoscopy specimens, surgical specimens or aspirations by needle & syringe
Bone and joint	Aspirates of joint fluid or deep aspirates of drainages by needle & syringe.
Soft tissue	Deep aspirates, surgical specimens, biopsy material of tissue, aspirates of drainages or pus by needle and syringe

Cultures for obligate anaerobes are appropriate for wounds and abscesses in any location in the body. When infection is thought to have entered the body from any level of the gut, anaerobes should be considered as part of the infecting flora, e.g., peritonitis following penetrating wounds of the intestine, appendicitis or diverticulitis. The best specimens for determining lower respiratory tract infection, pulmonary abscess, and aspiration pneumonia are collected by needle aspiration of an abscess or biopsy.

In situations where an anaerobe is suspected (e.g., pulmonary, abdominal, or brain abscess; wounds with much necrotic tissue, or drainage with a particularly fetid odor), use a sterile syringe and needle to aspirate fluid. A small amount of sterile non-bacteriostatic saline may be injected into the wound or abscess if fluid cannot be readily aspirated. Eject bubbles from specimen. (To eject air from syringe before injecting specimen into anaerobic collection tube, invert an empty, sterile tube over the needle to catch any aerosols or specimen expressed with the air). Inject specimen into anaerobic collection tube.

Debrided tissue can also be put into the anaerobic collection tube. Hold tube upright with cap on top. Unscrew cap and septum. Do not tip tube, or carbon dioxide in tube will pour out and air will go into the tube. Put small strips of tissue into the tube. Screw cap and septum back in place.

The anaerobic collection tube is satisfactory for both anaerobic and aerobic cultures. Send entire tube full, if possible. Hold at room temperature--do not refrigerate or incubate. Swabs in transport media are not satisfactory for the isolation of anaerobes and will not be routinely processed for such (aerobic cultures only will be done). **DO NOT** put tissue or aspirates into transport medium. It will never be seen again. Submit these specimens in an anaerobic collection tube or in a sterile, screw-top tube or container.

Blood specimens are routinely cultured for anaerobes from the usual culture collection containers used for these specimens. For CSF, if anaerobes are suspected, an anaerobic collection tube should also be sent.

b. Specimen Selection for Anaerobic Culture

Acceptable
Aspirates
Biopsy
Draining wounds
Surgical specimens
Tissue

Not Acceptable**
Nasopharyngeal
Gingival
Bronchial washings
Vaginal or cervical swab
Surface swabs
Material adjacent to membrane

** These specimens may normally contain anaerobic bacteria not related to infection and are therefore unacceptable for anaerobic culture, even if received in anaerobic collection tubes.