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**Lab Dept/Section:** Microbiology/Virology

**Test Name:** SPUTUM CULTURE AND GRAM STAIN

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***General Information***

**Lab Order Codes:** SPUC

**Synonyms:** Culture, Sputum

**CPT Codes:** 87070 – Culture, bacterial; any other source except urine, blood or stool, with isolation and presumptive identification of isolates  
87205 – Smear, primary source with interpretation; Gram or Giemsa stain for bacteria, fungi or cell types

The following testing may be added if appropriate based on findings for organism identification (multiple additions are possible if more than one organism is identified) and to aid in patient treatment management.

87077 – Aerobic isolate, additional methods required for definitive identification, each isolate (if appropriate)  
87106 – Culture, fungi, definitive identification, each organism, yeast (if appropriate)  
87107 – Culture, mold, definitive identification, each organism, mold (if appropriate)  
87147 – Culture, typing; immunologic method, other than immunofluorescence (e.g., agglutination grouping), per antiserum (if appropriate)  
87184 – Susceptibility studies, disk method, per plate (if appropriate)  
87185 – Enzyme detection (eg, beta lactamase), per enzyme (if appropriate)  
87186 – Susceptibility studies, microdilution or agar dilution, each multi-antimicrobial, per plate (if appropriate)  
87206 – Smear, primary source with interpretation, fluorescent and/or acid fast stain for bacteria, fungi or cell types (if appropriate)

**Test Includes:** Culture for aerobic flora and Gram stain to assess specimen quality.

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***Logistics***

**Lab Testing Sections:** Microbiology

**Phone Numbers:** MIN Lab: 612-813-5866

STP Lab: 651-220-6555

**Test Availability:** Daily, 24 hours

**Turnaround Time:** Preliminary report available at 1 day, final report within 2 - 5 days.

**Special Instructions:**

- **Specimen site** and **date/time of collection** are required for processing.
- Cultures from patients having cystic fibrosis must be specified because special isolation procedures are required. If a *Mycobacterium* species (AFB, TB), fungus or a virus is suspected, refer to [AFB Culture](#), [Fungal Culture](#) or [Viral Culture](#).

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### ***Specimen***

**Specimen Type:** Sputum, deep cough or aspirate; swabs are less desirable

**Container:** Sterile container

**Volume:** 1 - 2 mL sputum

**Collection:** **Sputum (Expectorate):**

1. Collect early morning specimen under the direct supervision of a nurse or a physician.
2. Have patient rinse or gargle with water to remove superficial flora.
3. Instruct patient to cough deeply to produce a lower respiratory specimen.
4. Exam specimen to make sure it contains thick mucus. Do not submit saliva.

**Sputum (Induced):**

1. Have patient rinse mouth with water after brushing gums and tongue.
2. With the aid of a nebulizer, have patients inhale about 25 mL of 3 to 10% sterile saline.
3. Collect the induced sputum in a sterile container.

**Transport/Storage:** **Onsite collections:** Transport specimen to the Microbiology Laboratory immediately at room temperature. Refrigerate if specimen cannot be promptly processed within 2 hours.

**Offsite collections:** Refrigerate specimen. Specimens must be promptly transported to the laboratory, with the next available courier, not to exceed 24 hours from the time of collection. However, delayed transport causes a delay of test results.

**Sample Rejection:** Improperly labeled specimen; specimens with prolonged transit time (see [Transport/Storage](#) for requirements); insufficient volume; external contamination. If an unacceptable specimen is received, the physician or nursing station will be notified and another specimen will be requested before the specimen is discarded.

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### ***Interpretive***

**Reference Range:** Usual upper respiratory flora

**Alert Value:**

- Gram-negative rods identified as ESBL or Carbapenemase producers will be called to the physician or patient's nurse. Infection Prevention will be notified.
- If MRSA is isolated for the first time, and the patient location is not Emergency department, the result will be called to the physician or patient's nurse.
- If Group A *Streptococcus* or *Burkholderia* are isolated from a patient with CF, the result will be called to the physician or patient's nurse.
- If any acid-fast bacilli is isolated, the result will be called to the physician or patient's nurse.

**Limitations:**

Diagnosis of lower respiratory tract infection is frequently complicated by the contamination of specimens with upper respiratory tract secretions during collection. Because the upper respiratory tract may be colonized with potential pathogens not involved in the infection of the lower tract, cultures may not be sensitive or specific for the diagnosis of bacterial pneumonia and results should be interpreted with caution.

**Methodology:**

Culture

**Additional information:**

All Gram stains are scanned for the presence or absence of white blood cells (indicative of infection) and squamous epithelial cells (indicative of mucosal contamination) that give information about the specimen quality. Sputum specimens showing >10 squamous epithelial cells per low power field, regardless of the number of white cells, is indicative that the specimen is grossly contaminated with saliva and the culture results cannot be properly interpreted.

Usual upper respiratory flora includes alpha and non-hemolytic streptococci, micrococci, *Corynebacterium* sp., coagulase negative staphylococci, *Neisseria* sp., *Lactobacillus* sp., *Stomatococcus* sp., *S. pneumoniae*, *Actinomyces* sp., *Haemophilus* sp., *M. catarrhalis*, and a few colonies of *S. aureus*, Gram-negative rods, and yeast. If present in significant numbers, *H. influenzae*, *S. pneumoniae*, *S. aureus*, and *M. catarrhalis* will be identified. Muroid strains of *P. aeruginosa* are generally associated with cystic fibrosis.

**References:**

Cook, JH, and M Pezzlo (1992). Specimen receipt and accessioning. Section 1. Aerobic bacteriology, 1.2.1-4. In HD Isenberg (ed) Clinical Microbiology Procedures Handbook. American Society for Microbiology, Washington DC

Miller, J Michael (1999) A Guide To Specimen Management in Clinical Microbiology, American Society for Microbiology, Washington DC

Miller, J Michael, and HT Holmes (1999) Specimen Collection, Transport, and Storage In PR Murray et al, (ed), Manual of Clinical Microbiology, 7th edition, American Society for Microbiology, Washington DC, pp 33-104

**Updates:**

3/22/2010: CPT Update

3/7/2011: CPT Update

6/20/12: Alert Value added

11/20/2014: Addition of offsite collection information