
Lab Dept: Microbiology

Test Name: GRAM STAIN

General Information

Lab Order Codes: GRAM

Synonyms: Smear, Gram Stain; Bacterial Smear, Gram Stain

CPT Codes: 87205 - Smear, primary source with interpretation; Gram or Giemsa stain for bacteria, fungi or cell types

Test Includes: Microscopic exam of Gram stained material including quantitative evaluation of microorganisms and relevant cells.

Logistics

Lab Testing Sections: Microbiology

Phone Numbers: MIN Lab: 612-813-5866

STP Lab: 651-220-6555

Test Availability: Daily, 24 hours

Turnaround Time: Routine: 24 hours; Stat: 60 minutes

Special Instructions:

- **Specimen site** and **date/time of collection** are required for processing.
- Gram's stain is not as sensitive or specific as culture. If organism identification and susceptibilities are desired, a culture must be requested.

Specimen

Specimen Type: Most specimen types; not useful for throat or feces except to screen for overgrowth of yeast.

The following cultures automatically include a Gram stain: Abscess, Body Fluid, Bronchoscopy, CSF, Duodenal Aspirate, Ear, Endotracheal, Eye, Skin, Sputum, Tissue, Tracheal, Wound and Yeast Only cultures.

Container: Sterile container or swab transport system

- White top, Liquid Stuart (CHC #359) or
- Red top double swab, Liquid Stuart (CHC #19092)

Collection:	Collection procedure same as for routine culture of the specific site. Specimen must be collected to avoid contamination with skin, adjacent structures, and non-sterile surfaces.
Transport/Storage:	Onsite collections: Transport to the Microbiology Laboratory immediately. 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.
Sample Rejection:	Improperly labeled specimen; specimens with prolonged transit time (see Transport/Storage for requirements); specimen not submitted in appropriate transport container, 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.

Interpretive

Reference Range: Dependent on site/source of specimen

Limitations:

- The Gram stain provides preliminary identification information only. Use results of Gram stain in conjunction with other clinical and laboratory findings. Additional procedures, such as culture, must be used to confirm findings suggested by Gram stain. Culture is necessary for definitive identification and susceptibility testing.
- Gram stain results, including organism morphology, can be affected by the age of the isolate, bacteria containing autolytic enzyme systems, cultures transferred from antibiotic-containing media, as well as specimens collected from patients on antibiotics.
- Background material and artifacts can also interfere with interpretation. A Gram positive coccoid artifact is inherent in the raw material currently used to make safranin.
- Gram stain-positive, culture-negative specimens may be the result of contamination of reagents and other supplies, presence of antimicrobial agents, or failure of organisms to grow under usual culture conditions (medium, atmosphere, etc.).
- Gram stain is not recommended on female genital specimens for *Neisseria gonorrhoeae* because of lack of specificity.
- Certain organisms do not stain well or at all with Gram stain such as mycobacteria (TB) or *Legionella*.
- False negative results occur with Gram stain due to low number of organisms present in specimen (direct smears from blood specimens).

Methodology: Gram stain

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.

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:

11/30/2011: Specimen types updated, now includes duodenal and gastric aspirates as well as yeast only cultures.

11/18/2013: Gastric aspirate removed, no longer acceptable specimen type.

11/20/2014: Offsite information added.