

Challenge G151

May 2015

Gram: Intra-abdominal abscess – yeast cells and neutrophils

HISTORY

A simulated intra-abdominal abscess smear collected from a 56 year old male post-operative, intra-abdominal, intensive care unit (ICU) patient, with sepsis was sent to category A, B, C, and C1 laboratories.

Participants were expected to report the presence of neutrophils and yeast cells.

CMPT QA/QC & STATISTICS

The samples are assessed for homogeneity and stability using in-house quality control methods and random selection of samples before and during production, and post sample delivery. The number of random samples selected is based on selection tables within Military standard 105E 1.

The sample contained 3+ (11-50/oif) yeast cells and 4+ (>10/oif) neutrophils (Figure 1). A culture of *Candida glabrata* was used to prepare the slides.

Cells were prepared from whole peripheral blood thus, epithelial cells were not present.

The challenge sample lot was confirmed to be homogeneous and stable for at least 15 days.

All challenge components have in-house assigned values based on the most clinically appropriate result; the most clinically appropriate result is determined by expert committee evaluation. No further statistical analysis is performed on the results beyond that described under "Suitability for Grading."

MAIN EDUCATIONAL POINTS from G151

1. The most important educational point from this Gram smear is that in a post-surgical ICU patient the presence of yeasts in the smear should not be ignored.
2. The incidence of yeast infections increases significantly in patients who have undergone abdominal surgical procedures.
3. Follow up identification and potential susceptibility testing may be important to prevent sepsis and further complications.

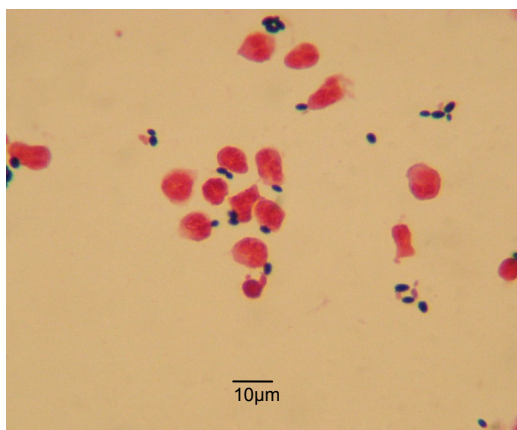


Figure 1. Gram stain of G151; simulated intra-abdominal abscess at 1000x magnification under oil immersion demonstrating neutrophils and yeast.

Grading

Maximum grade: 8

Reporting the presence of neutrophils / white blood cells was graded 4.

Reporting 'no cells seen' was graded 0.

Reporting the presence of yeast cells was graded 4.

Reporting the absence of organisms was graded 0.

Reporting results using the incorrect identifier was graded 0 for each component.

SURVEY RESULTS

Reference laboratories

Cells: 13/13 (100%) laboratories reported >25/oif, 1+, 4+ neutrophils /white blood cells (WBC).

Table 1. Reported results—Cells

Reported results- Cells	A Labs	B Labs	C Labs	C1 Labs	Total	Grade
>10 to >25/oif, 1+ to 4+ neutrophils/WBC/leucocytes/pus cells	57	5	3	17	82	4
3+ neutrophils, 1+ mononuclear cells	1				1	4
no neutrophils seen	1	1			2	0
reported using the incorrect identifier	1				1	0
sample not normally processed	1				1	ungraded
Total	61	6	3	17	87	

Organisms: 13/13 (100%) laboratories reported >25/oif, 2+ to 4+ yeast.

Participants:

Cells (Table 1): 83/87 (95%) participant correctly reported the presence of neutrophils/WBC/leucocytes or pus cells and were graded 4. Two participants reported ‘no neutrophils seen’ and were graded 0 as did the laboratory that reported results using the incorrect identifier.

Organisms (Table 2): 84/87 (97%) laboratories correctly reported the presence of yeast / yeast-like organisms and were graded 4. One participant reported ‘no organisms seen’ and was graded 0 as did the laboratory that reported results using the incorrect identifier.

Suitability for Grading

A challenge is considered suitable for grading if agreement is reached by 80 percent of the selected reference group and at least 50 percent of the participants.

Identification of cell and organisms components was correctly performed by at least 80 percent of reference laboratories and greater than 50 percent of all laboratories thus, both components were determined to be suitable for grading.

COMMENTS ON RESULTS

Gram smear results were performed very well on this sample. The two laboratories that did not identify neutrophils should review the smear as should the laboratory that did not observe any organisms on the smear. Also important is reporting using the correct identifier as a measure of quality assurance.

CLINICAL SIGNIFICANCE

Intra-abdominal candidiasis (IAC) develops after the introduction of *Candida* into the normally sterile peritoneal cavity. ¹ IAC manifestations include peritonitis and intra-abdominal abscesses and occur in >40% of patients following repeat gastrointestinal (GI) surgery, GI perforation, or necrotizing pancreatitis. ²

Candida species are found as a normal part of microflora of human mucosal surfaces. *C. glabrata*, like *C. albicans*, is considered to be a human commensal.

Although *C. albicans* is the predominant species that causes invasive candidiasis, *C. glabrata* has emerged as the most common non-*albicans Candida* in North America. ³

REFERENCES

1. Cheng S, Clancy CJ, Xu W, et al. Profiling of *Candida albicans* Gene Expression During Intra-abdominal Candidiasis Identifies Biologic Processes Involved in Pathogenesis. *Journal of Infectious Diseases*. 2013;208:1529-1537.
2. Cheng S, Clancy CJ, Hartman DJ, Hao B, Nguyen MH. *Candida glabrata* Intra-Abdominal Candidiasis Is Characterized by Persistence within the Peritoneal Cavity and Abscesses. *Infection and Immunity*. 2014;82:3015-3022.
3. Rangel-Frausto MS, Wiblin T, Blumberg HM, et al. National epidemiology of mycoses survey (NEMIS): variations in rates of bloodstream infections due to *Candida* species in seven surgical intensive care units and six neonatal intensive care units. *Clin Infect Dis*. 1999;29:253-258.

Table2. Reported results—Bacteria

Reported results - Organisms	A Labs	B Labs	C Labs	C1 Labs	Total	Grade
11 to >50/oif, 2+ to 4+ yeast /yeast-like organisms/ forms ± no bacteria seen ± budding	59	6	3	16	84	4
reported using the incorrect identifier	1				1	0
no organisms seen				1	1	0
sample not normally processed	1				1	ungraded
Total	61	6	3	17	87	