

**MYCOLOGY ROTATION GUIDELINES FOR
MEDICAL TECHNOLOGY STUDENTS, PATHOLOGY RESIDENTS, AND VISITORS**

I. INTRODUCTION:

The mycology Laboratory of the Medical Mycology Research Center at the University of Texas Medical Branch offers hands-on training in medical mycology techniques. This may include, but is not limited to, identification of yeasts and moulds, direct microscopy of specimens, CAP survey organisms, and general mycology laboratory troubleshooting. The students should have general microbiological knowledge and skills, and be knowledgeable in handling infectious pathogenic microorganisms. Medical technology students are advised to review the handouts prior to their scheduled rotation. They should also be encouraged to answer the study questions.

II. OBJECTIVES:

The students shall have the opportunity to

- A. define terms used in clinical mycology.
- B. identify specimens appropriately for processing.
- C. select appropriate media for plating specimens and subculturing organisms.
- D. properly prepare, read, and interpret KOH preparations.
- E. recognize yeast, moulds, and aerobic actinomycetes from bacteria in the culture plates.
- F. properly prepare tease mounts, Scotch tapes, and slide cultures.
- G. identify moulds and aerobic actinomycetes listed in guidelines.
- H. identify yeast from culture plates using appropriate identification methods.
- I. keep work area clean and organized daily.

III. LOCATION:

The training will be held in the Medical Mycology Research Center located on the campus of the University of Texas Medical Branch, Galveston, Texas.

IV. GUIDELINES:

- A. Specimen Processing:
 - 1. Prior to the rotation, students will review their lecture notes and handout materials.
 - 2. Prior to the rotation, students will review the Mycology Laboratory Manual sections on:
 - a. Laboratory safety
 - b. Clinical specimens

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IV. **GUIDELINES:** (cont'd)

3. On the first day of the rotation, students should be prepared to answer questions concerning:
 - a. safety rules and procedures.
 - b. specimen collection, transport, and storage.
 - c. infectious specimens.
 - d. routine media used for isolation and culture of fungi.

B. Identification Procedures:

1. Prior to the rotation, students will review their lecture notes, textbooks, and handout materials concerning the identification of fungi and aerobic actinomycetes, and the diseases that they cause.
2. Prior to the rotation students will review the Clinical Mycology Laboratory Manual sections on:
 - a. aerobic actinomycete identification.
 - b. mould identification.
 - c. yeast identification.

C. Specimen Processing

1. During the rotation, students will observe and assist the technologist in the processing mycology specimens. Students will:
 - a. handle specimens in the safe manner according to the protocols in the lab manual.
 - b. assist in the labeling of media and checking requisitions.
 - c. assist in media inoculation and smear preparation.
 - d. incubate media.
2. During the rotation, students will examine KOH and India Ink preps of the clinical specimens and of preserved specimens available in the lab. Students should be able to recognize the following:
 - a. budding yeast.
 - b. Pseudohyphae
 - c. hyphae
 - (1) "*Aspergillus*" type
 - (2) Zygomycetous type
 - (3) *Candida* type
 - (4) Dematiaceous type
 - (5) "dermatophyte" type in skin scrapings
 - d. *Cryptococcus neoformans*
 - e. *Blastomyces dermatitidis*
 - f. *Candida albicans*
 - g. spherules of *Coccidioides immitis*

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IV. GUIDELINES: (cont'd)

3. During the rotation students will develop an understanding of the difficulty in ascribing clinical significance to fungi seen in the direct examination of specimens. Students will distinguish significant results and recognize the necessary information that is included in an oral and written report.

D. Identification Procedures:

1. During the rotation students will observe and assist the technologist in the isolation and identification of fungi and aerobic actinomycetes. Students will
 - a. assist in the reading of culture media.
 - b. assist in setting up and interpreting germ test tubes and reporting the results.
 - c. assist in the inoculation and interpretation of yeast assimilations (Vitek or API strips) and corn meal agar plates.
 - d. assist in preparing and interpreting slide cultures.
2. During the rotation, students will observe demonstrations, slide cultures, and other materials in the laboratory to complete the following.
 - a. Correlate Vitek or API 20C identification with corn meal agar morphology for the following yeasts:
 - (1) *Cryptococcus* sp., especially *C. neoformans*
 - (2) *Rhodotorula* sp.
 - (3) *Candida* species, especially *C. albicans*
 - (4) *Trichosporon* sp.
 - (5) *Geotrichum* sp.
 - (6) *Torulopsis* sp.
 - (7) *Saccharomyces cerevisiae*
 - (8) *Blastoschyzomyces capitatus*
 - (9) *Malassezia furfur*
 - b. Study the following moulds and mould-like organisms. Emphasis should be on the organism marked with an asterisk.

Absidia sp.

Acremonium sp.

Aspergillus clavatus

* *A. flavus*

* *A. fumigatus*

A. glaucus - group

* *A. niger*

Aureobasidium pullulans

Bipolaris australiensis

B. hawaiiensis

* *B. spicifera*

* *Blastomyces dermatitidis*

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IV. GUIDELINES: (cont'd)

- Chaetomium sp.*
- Chrysosporium sp.*
- Cladosporium carrionii*
- Cladosporium sp.*
- * *Coccidioides immitis*
- Drechslera biseptata*
- Epicoccum sp.*
- * *Epidermophyton floccosum*
- Exophiala castellanii*
- * *E. jeanselmei*
- E. moniliae*
- E. pisciphila*
- Exserohilum mcginnisii*
- * *E. rostratum*
- * *Fonsecaea pedrosoi*
- * *Fusarium sp.*
- Gliomastix sp.*
- * *Histoplasma capsulatum*
- Hormonema dematioides*
- Humicola sp.*
- Lecythophora hoffmanii*
- * *Microsporum audouinii*
- * *M. canis*
- * *M. gypseum*
- * *Nocardia asteroides*
- * *N. brasiliensis*
- * *N. otitis-caviarum*
- Paracoccidioides brasiliensis*
- Paecilomyces lilacinus*
- P. variotii*
- Penicillium sp.*
- Phaeoannellomyces sp.*
- Phaeococcomyces sp.*
- Phialemonium sp.*
- Phialophora parasitica*
- P. repens*
- * *P. verrucosa*
- Phoma sp.*
- * *Pseudallescheria boydii*
- * *Rhizomucor pusillus*
- Saksenaea vasiformis*
- Scedosporium prolificans*
- Scopulariopsis sp.*
- * *Sporothrix schenckii*
- * *Trichophyton mentagrophytes*
- * *T. rubrum*
- T. schoenleinii*
- T. terrestre*

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- * *T. tonsurans*
- T. verrucosum*
- Ustilago* sp.
- * *Wangiella dermatitidis*
- * *Xylohypha bantiana*

E. Fungus Immunoserology

During the rotation the students will observe and assist the technologist in the preparation and interpretation of the *Cryptococcus neoformans* Latex Agglutination Test and the Fungal Immunodiffusion Test.

F. Culture Unknown and Grading

Culture unknowns, quiz, and tests will be given. The mycology grading will be part of the microbiology rotation final grading (10-15% of the final examination).

G. Suggested Reading and References

1. Balows A., *et al.* (eds.), Manual of Clinical Microbiology, ASM, Washington, DC, 1981.
2. McGinnis, MR, Laboratory Handbook of Medical Mycology, Academic Press, Inc., New York, 1980.
3. McGinnis, MR, Pictorial Handbook of Medically Important Fungi and Aerobic Actinomycetes, Praeger Publishers, New York, 1982.
4. Rippon, TW, Medical Mycology: The Pathogenic Fungi and the Pathogenic Actinomycetes, Third Edition, The WB Saunders Co., Philadelphia, 1988.