RESIDENT OBJECTIVES AT MSH

SPECIMENS

Reference: Cumitech 9. Collection and Processing of Bacterilogical Specimens

The resident shall:

1.0 Identify properly collected and transported specimens

2.0 Recognize and state problems in poor or unsuitable specimens

3.0 Demonstrate proper and safe handling of all specimens

4.0 Demonstrate proper use of the biological safety cabinet and how it works

CULTURAL TECHNIQUES

The resident shall:

1.0 Select suitable primary media for all types of specimens

2.0 Recognize specimens that should be set up for anaerobes and understand the importance of handling anaerobic specimens promptly and planting them on pre-reduced media

3.0 Demonstrate proficiency inoculating and streaking a specimen on agar media

4.0 Be able to set up cultures in an anaerobic atmosphere and a 5-10% CO_2 atmosphere

5.0 Perform quantitative cultures and report the colony count

6.0 Prepare and read a simple wet mount for *Trichomonas vaginalis* specimen

7.0 Examine and report on the suitability of a sputum for culture (screening of a sputum)

STERILIZATION

Reference: Disinfection, Sterilization, and Preservation, Block, Fourth Edition.

The resident shall:

1.0 Demonstrate aseptic technique

2.0 Select and perform correct sterilization for all types of media and objects

3.0 Demonstrate an understanding of these methods of sterilization and how to quality control them

- 3.1 Dry heat
- 3.2 Moist heat
- 3.3 Filtration
- 3.4 Ultra violet irradiation
- 3.5 Ethylene oxide
- 3.6 Gamma radiation

4.0 Demonstrate an understanding of disinfection

- 4.1 Select proper disinfection for cleaning lab equipment and spills

MEDIA

Reference: Media for Isolation - Cultivation - Identification Maintenance of Medical Bacteriology, McFadden

For media used in the laboratory the resident shall:

1.0 List the main ingredients and describe their functions

2.0 State the classification of the media

3.0 Quality control the medium by

- 3.1 Checking sterility
- 3.2 Checking pH and appearance

3.3 Checking biochemical and growth of control organisms
3.4 Checking media storage is at proper temperature and length of time

GRAM STAIN

For the Gram stain, the resident shall:

1.0 State principle of Gram's method

2.0 Perform a Gram stain

3.0 Recognize and state problems in poor or incorrectly stained slides

4.0 Recognize and report on Gram stained slides of specimens and cultures

5.0 Quantitatively report on direct smears

MICROSCOPY

The resident shall:

1.0 State the principles of operation of light, phase contrast and UV microscope

2.0 Demonstrate proper use and care of the microscopes

3.0 Be able to perform Kohler illumination

SAFETY / WHIMIS

The resident shall:

1.0 State the safety rules for a clinical laboratory

2.0 State procedure to be used for cleanup of various spills:

2.1 Chemical
2.2 Radioactive
2.3 Blood
2.4 Specimens

3.0 Demonstrate proper safety techniques for handling specimens

4.0 State the principles of WHMIS

5.0 Demonstrate the proper handling of chemicals while using MSDS

6.0 Perform all procedures using chemicals using safety techniques as stated in the MSDS

DIAGNOSTIC OBJECTIVES (urine, genital, enteric, respiratory, wound and fluid benches).

Reference: Cumitechs:
- 4A. Laboratory Diagnosis of Gonorrhea
- 14A. Laboratory Diagnosis of Central Nervous System Infections
- 12A. Laboratory Diagnosis of Bacterial Diarrhea
- 17. Laboratory Diagnosis of Female Genital Tract Infections

Clinical Microbiology Procedures Handbook. Editor: Isenberg

For the following sites:

a) respiratory tract (upper and lower)
b) intestinal tract
c) genitourinary tract
d) skin
e) urine
f) blood
g) CSF
h) sterile fluids
i) tissues

The resident shall:

1.0 State which specimens to be taken for the clinical picture of the patient.

2.0 State the specimens to be taken for proper lab work up.

3.0 State the proper collection methods including appropriate time for specimens to be taken, the amount and how to be transported to the laboratory.

4.0 State the organisms that commonly occur as pathogens, plus state what organisms may occur as commensal flora.

5.0 Recognize and differentiate pathogens from commensal flora in the specimens.

For all the organisms listed below:

Staphylococcus aureus
Coagulase negative Staphylococcus
Staphylococcus saprophyticus
Streptococcus pyogenes
Streptococcus agalactiae
Streptococcus pnuemoniae
Viridans Streptococcus
Enterococcus spp.
Streptococcus milleri group
Neisseria gonorrhoeae
Neisseria meningitidis
Moraxella catarrhalis
Pseudomonas aeruginosa
Burkholderia cepacia
Acinetobacter species
Pasteurella multocida
Shigella species
Salmonella typhi
Salmonella spp.
Escherichia coli
Yersinia enterocolitica
and all *Enterobacteriaceae*

Haemophilus influenzae
Haemophilus species
Campylobacter jejuni/coli
Campylobacter fetus
Listeria monocytogenes

Corynebacterium diphtheriae
Corynebacterium jeikium
Actinomyces israelii
Nocardia asteroides
Clostridium difficle
Clostridium perfringens
Bacteroides fragilis group
Prevotella melaninogenicus
Fusobacterium species
Propionibacterium species
Mycobacterium species
Mycobacterium tuberculosis
Candida albicans
Candida species
Cryptococcus neoformans

The resident shall:

1.0 Identify and record colonial appearance

2.0 Select optimal temperature, gaseous requirement and suitable media for isolation. Describe any special media that may be required, their main ingredients and functions.

3.0 Describe as applicable the typical cellular morphology, Gram stain reaction or wet mount appearance in direct smears and in culture.

4.0 Select and perform differential tests for identification.

5.0 Interpret all tests performed and identify the organisms.

6.0 State the principles, reagents and controls involved in all the differential tests for identification.

7.0 State the optimal method of susceptibility testing and the typical susceptibility pattern.

8.0 State the epidemiology, clinical significance and infection control implications.

9.0 State the problems of laboratory detection, identification and susceptibility testing.

BLOOD CULTURES

Reference: Cumitech 1A. Blood cultures II

The resident shall:

1.0 State in what clinical situations blood cultures are to be taken.

2.0 State the proper collection methods.

3.0 For the blood cultures bottles

- 3.1 list the major ingredients, and understand the purpose of each.
- 3.2 state the recommended incubation time and temperature for all types of blood cultures.
- 3.3 explain how and why blood cultures are subcultured.

4.0 For the Blood Culture machine in the laboratory

- 4.1 state the principle of operation
- 4.2 demonstrate proficiency in operating the machine
- 4.3 perform regular routine maintenance
- 4.4 recognize and solve minor problems

5.0 Demonstrate the proper procedures for working up positive blood cultures.

6.0 Describe the operation of the following blood culture system

- 6.1 conventional
- 6.2 lysis centrifugation
- 6.3 infrared
- 6.4 radiometric
- 6.5 colorimetric detection (Bac-T-Alert)

ANAEROBES

Reference: Cumitech 5A. Practical Anaerobic Bacteriology

The resident shall:

1.0 Describe the principles of the anaerobic jar and anaerobic chamber, PRAS and rolled tube systems.

2.0 Operate the anaerobic jar utilizing proper techniques for achieving and monitoring anaerobiosis.

3.0 Differentiate organisms by their oxygen requirements.

4.0 State which specimens are suitable for anaerobic culture.

5.0 Describe the proper collection technique and transport for anaerobic specimens.

6.0 Discuss the type of media to be used for anaerobes.

GENITALS

The resident shall:

1.0 Define bacterial vaginosis.

2.0 Differentiate between vaginosis, vaginitis or normal vaginal flora by Gram stain and wet preparations.

3.0 For *Trichomonas vaginalis* the resident shall:

3.1 describe how to examine a wet mount.
3.2 state it's main differentiating characteristics
3.3 explain clinical significance

ANTIMICROBIAL SUSCEPTIBILITY TESTING

Reference: Cumitechs 25. Current Concepts and Approaches to Antimicrobial Agent Susceptibility Testing

6A. New Developments in Antimicrobial Agent Susceptibility Testing: A Practical Guide

NCCLS Guidelines

The resident shall:

1.0 Discuss all the antimicrobial agnets used in the laboratory by:

- 1.1 describing their antimicrobial spectrum
- 1.2 stating the kind of activity they have (bactericidal, bacteriostatic)
- 1.3 identifying the agents by their class

2.0 For each of the following antimicrobial susceptibility testing methods:

Kirby Bauer
MIC / MBC broth dilution
MIC agar dilution
MIC micro broth dilution

- 2.1 state the principle
- 2.2 perform and report results of the methods used in the laboratory
- 2.3 select proper quality control procedures and indiate what troubleshooting would be done if the QC did not work
- 2.4 explain limitations of each method

3.0 Describe the Beta Lactamase Test by:

- 3.1 explaining the principle of the nitrocefin, acidometric, and iodometric methods
- 3.2 performing and reporting the results
- 3.3 stating the clinical significance of β-lactamase producation

ANTIMICROBIAL SUSCEPTIBILITY TESTING

The resident shall:

4.0 Identify Methicillin Resistant *Staphylococcus aureus* (MRSA) by:

- 4.1 explaining how MRSA's are detected
- 4.2 stating the clinical significance of such an isolate
- 4.3 discussing the problems in detecting MRSA

5.0 Identify Penicillin resistant Pneumococcus by:

- 5.1 explaining the procedure used for screening and confirmation
- 5.2 stating the criteria used to define resistance, relative resistance, and susceptible to Penicillin
- 5.3 describing the clinical significance

6.0 Discuss the emerging new trends for susceptibility testing of *Enterococcus* by:

- 6.1 explaining what synergy is and shy it's important for *Enterococcus*
- 6.2 determining synergy between Ampicillin and Gentamicin by the different methods available
- 6.3 performing high level aminoglycoside testing and interpreting the results
- 6.4 VRE

7.0 ESBLs

SEROLOGY

Reference: Manual of Clinical Laboratory Immunology, Fourth Edition.

The resident shall:

1.0 Define antibody and antigen

2.0 State the principle, perform, read, report and interpret the results for the following tests:

Chlamydia PCR
Hepatitis AXSYM
Rubella AXSYM

CMV AXSYM
VZV - VIDAS
Heterophile Antibody (screening test)
Cryptococcal Latex Agglutination
RPR (VDRL) Syphilis Screening Test
HIV PCR
HIV EIA
HTLV-1 EIA
HCV RNA
HBV DNA

MYCOLOGY

The student shall:

1.0 Identify properly collected and transported specimens for culture.

2.0 Perform and report on microscopic preparations form direct specimens by identifying fungal elements.

3.0 Select suitable primary media and atmospheric conditions for each specimen.

4.0 Describe cultural requirements and differentiate the following microscopically and culturally:

Microsporum
Trichophyton
Epidermophyton
Aspergillus species
Blastomyces dermatitidis
Coccidioides immitis
Histoplasma capsulatum
Sporothrix schenkii
Penicillium species
Yeast (eg. Candida, Crypto)

5.0 Describe the appearance of *Malassezia furfur* in a direct mount of skin scales.

VIROLGOY

Reference:

1. Schmidt N., Emmons R. Diagnostic Procedures for Viral, Rickettsial and Chlamydial Infections. 1989: American Public Health Association, New York. Sixth Edition.

2. Wiedbrauk D., Johnston S. Manual of Clinical Virology. 1993: Raven Press, New York.

3. Lennette E. (Ed.) Laboratory Diagnosis of Viral Infections. 1992: Marcel Dekker, New York. Second Edition.

The resident shall:

1.0 Describe how a virus differs from bacteria.

2.0 For the following virus families:

a) Herpesviridae
b) Orthomyxoviridae
c) Paramyxoviridae
d) Parvoviridae
e) Retroviridae
f) Togaviridae
g) Picornaviridae
h) Reoviridae

2.1 Classify according to:
- a) RNA or DNA
- b) Single or double stranded
- c) Nucleocapsid symmetry
- d) Positive or negative sense
- e) Prescence / absence of envelope
- f) Size range

2.2 State the important human pathogens within these families.

3.0 Explain what is meant by the following terms and give 2 examples for each:

- a) Primary cell line
- b) Diploid cell line
- c) Continuous cell line

4.0 List the major components of:

a) Viral Transport Media
b) Growth Media
c) Maintenance Media

5.0 For the following culture methods:

a) Shell vial technique
b) Tube culture technique

5.1 Briefly describe the method
5.2 List advantages and disadvantages for each method.

6.0. For the following viral illnesses:

a) Herpes zoster
b) Viral meningitis
c) Systemic CMV disease
d) Viral respiratory illness

6.1 List the appropriate specimens to be collected.
6.2 Describe appropriate specimen collection, transport and storage techniques.
6.3 Describe suitable inoculation and incubation techniques including selection of appropriate cell lines, culture methods and incubation.
6.4 State the virus(es) which may be expected to be detected.
6.5 Describe any rapid tests which may be used to aid in diagnosis.

7.0 For the viruses listed below:

a) Herpes simplex type 1 and 2
b) Cytomegalovirus
c) Varicella Zoster
d) Influenza A and B
e) Parainfluenza 1, 2, and 3
f) Respiratory syncytial virus
g) Adenovirus
h) Enterovirus
i) Coxsackievirus
j) Poliovirus

7.1 State the optimal cell line(s) for isolation.
7.2 State the virus' effect on that cell line including a description of any cytopathic effect produced.
7.3 Describe the test(s) used for definitive identification once isolated, including any controls needed. (e.g. IFA stains)

8.0 Describe one method of anti-viral susceptibility testing.

CMV ANTIGENEMIA

The resident shall:

1.0 Explain the significance of determining the presence of CMV antigen in the blood.

2.0 Show proficiency in CMV Antigenemia testing by:

2.1 Discussing proper specimen collection.
2.2 Stating the principle of the procedure.
2.3 Performing the procedure with quality control.
2.4 Reporting results including quantitation of positive samples.