

# **Syllabus for the Specialist in Medical Laboratory Science Microbiology SCCM(MLS)**

## **Overview**

Candidates seeking the SCCM(MLS) designation are expected to have a fundamental knowledge base and be familiar with general microbiology laboratory principles and techniques, as well as those specific to the candidates chosen area of expertise.

The category of Specialist in Medical Laboratory Science Microbiology of the Canadian College of Microbiologists has six areas of expertise. These are:

1. Laboratory instrumentation and equipment
2. Rapid screening and identification
3. Sample collection and transport
4. Laboratory procedures
5. Laboratory operations
6. Public health

The following tasks are those of the medical laboratory specialist. Knowledge of the underlying principles, ability to carry out, or direct activities in these key areas and proper interpretation of laboratory results is expected of specialists in medical laboratory science.

### **1. Laboratory Instruments and Equipment**

Use and understand the principles of a steam autoclave

Use and understand the theory of ambient air, carbon dioxide and anaerobic incubators

Use and understand the principle of laboratory equipment such as pipettes, balances and pH meters in preparation of media and reagents

Use of bio-safety and laminar flow cabinet and fume hood

Use a light-field, dark-field and fluorescence microscope

Use and understand principles of systems designed to detect, identify and qualify micro-organisms (e.g., Vitek, MicroScan, E-Test, MIDI, blood culture detection instruments)

Select and understand the principles of stains and media used in identification procedures for bacteria, fungi, parasites and viruses

### **2. Rapid Screening and Identification**

Perform serological tests for syphilis

Select, perform and interpret techniques for the rapid identification of bacteria based on standard biochemical and enzymatic reactions

Select, perform and interpret techniques for the identification of viruses

Generate and interpret results of immunological procedures or tests such as agglutination, enzyme immunoassay, enzyme detection and fluorescent antibody (FA)

Understand theory and application of PCR, DNA probes and pulse-field gel electrophoresis

Know the capsular types of organisms that are of Public Health significance, e.g., *Neisseria meningitidis* Group C, *Haemophilus influenzae b*

### 3. Sample Collection and Transport

Select appropriate methods for collection, transport and storage of specimens

Select appropriate test procedures and media for the type of specimen received

Select appropriate incubation conditions for the type of specimen received

### 4. Laboratory Procedures

Isolate and identify the following:

Aerobic, gram-positive bacilli

*Bacteroides* and other gram-negative anaerobic bacilli

*Clostridium*, *Propionibacterium* or other gram-positive anaerobic bacteria

*Chlamydia*, *Mycoplasma* and *Ureaplasma*

*Salmonella*, *Shigella*, *Yersinia* and *E. coli* from enteric specimens

*Enterobacteriaceae*

*Pasteurella*, *Francisella*, *Brucella*, *Legionella* and *Bordetella*

*Haemophilus*

Mycobacteria

*Neisseria* and *Moraxella*

*Nocardia*, *Streptomyces* or *Actinomyces*

*Pseudomonas*

*Staphylococcus*

*Streptococcus* and *Enterococcus*

*Corynebacterium*

*Vibrio* and *Aeromonas*

*Campylobacter* and *Helicobacter*

Agents of superficial, cutaneous, subcutaneous and dermatophyte mycoses

Dimorphic fungi

Opportunistic fungi

Intestinal, urogenital protozoa

Blood and tissue protozoa

Intestinal and tissue helminths

Correlate arthropod vectors and modes of transmission with infectious agents

Know basic cell culture techniques for virus isolation and identification

Know the principles of and how to perform antibiotic susceptibility assays (e.g., broth and agar dilution, disc diffusion, E-Test)

Have a working knowledge of the more common type of antibiotic resistant organisms (AROs)

## 5. Laboratory Operations

- Use appropriate safety equipment and devices
- Use appropriate work practices to reduce the risk of acquiring laboratory infections
- Understand and know the principles of WHMIS
- Know procedures to monitor quality of media reagents, equipment and test methodologies
- Monitor and evaluate test results and data for accuracy and recognize aberrant results using manual or computer database systems
- Know the differences between a level II and a level III laboratory

## 6. Public Health

- Know the modes of transmission and the symptoms of disease caused by organisms that pose a threat to public health
- Know the general procedures for notifying the public health authorities of reportable diseases in the province of practice
- Know how to contain and dispose of infectious material in the community
- Know the agents that can be responsible for the following outbreak types:
  - Enteric/Food
  - Respiratory
  - Sexual
- Have a working knowledge of which organisms are level II, III and IV
- Have a working knowledge of where the agents that are classified as level III in Canada occur

### Example questions.

Usually about 70 questions of the type shown below are asked.

1. Which of the following descriptions best fits a typical strain of *Pseudomonas aeruginosa*?
  - a. motile, aerogenic, non-lactose fermenting, citrate negative
  - b. non-motile, aerogenic, lactose fermenting mucoid colony
  - c. motile, anaerogenic, non-lactose fermenting, indole positive
  - d. motile, aerogenic, lactose fermenting, indole positive
2. Which of the following is not considered an agent of sexually transmitted disease in Canada:
  - a. *Neisseria gonorrhoeae*
  - b. *Gardenerella vaginalis*
  - c. *Chlamydia trachomatis*
  - d. *Ureaplasma urealyticum*
  - e. HIV

Usually 9 or more of the following types of questions given below.

**3.** *Neisseria meningitidis* and *Neisseria gonorrhoeae* may cause invasive disease. Compare and contrast these pathogens in terms of the following:

- a. Their methods of laboratory detection.
- b. The immune status of the host
- c. Their presentation in the host

Incidence of infection i.e. will all individuals who are exposed to the organism become infected?

Essay questions

**4.** Write an essay not to exceed three pages on the paper provided on two of the following topics (2 topics = not to exceed 6 pages in total). (Remember that an essay is not just a list of topics or points and needs to be informative and brief).

- a. leprosy
  - b. SARS virus; all known aspects
- etc. usually more choices are given

