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**PRINCIPLES
AND PRACTICALS
IN MEDICAL
MICROBIOLOGY**

Principles and Practicals in Medical Microbiology

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INTRODUCTION

Enormous amounts of new information in medical microbiology are becoming available on a daily basis. The amazingly huge quantity of new data is often focused on details and too complicate situations for both undergraduate medical students and physicians. This book has been created for medical students to ease the comprehension of the relations between theory and practice in current medical microbiology. The core comprehensive data is reviewed from prestigious publications in the field (Brooks et al: Jawetz, Melnick & Adelbergs' Medical Microbiology, 24th edition, LANGE, 2007; Lippincott's Illustrated Reviews, Microbiology, 2nd edition, Lippincott Williams & Wilkins, 2007; Murray *et al*, Medical Microbiology, 5h edition, Elsevier Mosby, 2005) and professional experience of the authors.

Each chapter contains a theoretical and a practical part. The practical part is divided into a few exercises which allows for the practice of some of the basic experimental procedures used in laboratories of medical microbiology. We believe that the original photographs and the diagrams that have been newly created by the authors will improve the understanding of the basic principles of microbiological diagnosis. Each chapter is complemented with a lab quiz intended to help students review their knowledge.

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1 LABORATORY SAFETY RULES

1.1 Purpose of the safety principles

The purpose of the safety principles is to reduce or eliminate exposure of potentially hazardous agents to

- a) laboratory workers
- b) other people
- c) the outside environment

1.2 Principles

1. Use a protective lab coat and other appropriate items when handling potentially infected clinical materials or microbial cultures. Use the coat and the items only in the laboratory area.
2. Don't eat, drink or smoke and never touch your mouth, eyes or nose while in the laboratory.
3. Process clinical materials and cultures only in designated areas and never carry them away.
4. Keep your bench in order.
5. Sterilize bacteriological loops in a flame after usage, or use disposable ones.
6. After handling, cover petri dishes, tubes and flasks containing microbial cultures with a lid. (figure 1.1).
7. Disinfect laboratory glassware and other items with a disinfectant solution. If disposable, discard them into a special container.
8. Disinfect skin, mucosa and laboratory surfaces immediately after contamination with infectious agents.
9. After handling potentially infectious materials or cultures wash your hands in a disinfectant solution containing soap and rinse properly with running water.
10. All laboratory accidents should be reported immediately to the laboratory supervisor.
11. Respect the fire protection rules when working with fire.
12. Taking microbial cultures and laboratory animals away from the laboratory is strictly forbidden.

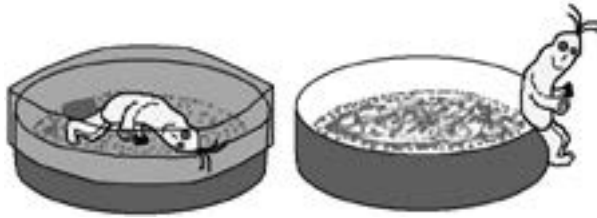


Fig. 1.1 Bacterial contamination. Make sure that you apply the laboratory safety rules to avoid spread of infection.

2 SPECIMEN COLLECTION & DIAGNOSTIC PRINCIPLES

2.1 Specimen collection & transport

The microbiological diagnosis is only as reliable as the quality of the specimen being tested (figure 2.1)!



Fig.2.1 There are three fundamental parts of microbiological a diagnosis: 1. specimen collection and transport, 2. results, 3. result interpretation

2.2 Material & methods

Specimens are collected from the patients using sterile tools such as swabs, tubes, containers etc. (figure 2.2). The rotating **swab** collects **surface specimen** (skin or underlying tissue) or specimen from **accessible mucosal surfaces** (e.g. pharyngeal swab) by direct contact with clinical material. The swab is then inserted into a transport medium. This is a medium without nutrients but with a preserving agent. **Blood, fluids and tissue samples** are collected into tubes and containers. Collected and labeled (errors may have disastrous consequences) specimen is sent with a **request form** to the lab as soon as possible (table 3.1).