

# **Safety Procedures and Precautions in the Microbiology Laboratory**

**All safety procedures and precautions followed in the microbiology laboratory are designed to:**

- I) Reduce or eliminate exposure of lab workers, other persons, and the outside environment to potentially hazardous microorganisms. *In other words, to restrict microorganisms present in specimens or cultures to the containers in which they are collected, grown, or studied.*
- II) Prevent environmental microorganisms (normally present on hands, hair, clothing, laboratory benches, or in the air) from entering (contaminating) specimens or cultures and interfering with results of studies.

## General Laboratory Directions

1. **Before entering the laboratory, remove coats, jackets, and other outerwear**
  - these should be left outside the laboratory, together with any backpacks, books, papers, or other items not needed for the work.
2. To be admitted to the laboratory, each student should **wear laboratory coat and appropriate shoes.**
3. Any student with a fresh, unhealed cut, scratch, burn, or other injury on either hand should notify the instructor before beginning or continuing with the laboratory work.
4. **Tie back long hair.**
5. Experiments are performed by each student individually.
6. Do not perform activities in the lab until you are given instructions by your laboratory instructor.
7. If you are in doubt as to the correct procedure, double-check the instruction. If doubt continues, consult your instructor. Avoid asking your neighbor for procedural help.
8. Keep working areas clear of all unnecessary items.
9. **Never remove specimens, cultures, or equipment from the laboratory under any circumstances !!!**
10. If you spill or drop a culture or if any type of accident occurs, call the instructor immediately
  - place a paper towel over any spill and pour disinfectant over the towel
  - let the disinfectant stand for 15 minutes, then clean the spill with fresh paper towels.
11. If you cut or burn yourself while working, call the instructor immediately.
12. Report all broken glassware to the instructor
  - broken glass should be placed in a special sharps container for disposal and not in the trash container.
13. **Before leaving the lab, make sure all items have been returned to their appropriate location.**
14. **Wash your hands thoroughly with antibacterial soap before leaving the laboratory !!!**

## Good Laboratory Practices

1. **Tie back long hair neatly, away from the shoulders.**
2. Do not wear jewelry to laboratory sessions.
3. **Keep fingers, pencils, and such objects out of your mouth.**
4. Avoid unnecessary movements in the lab
  - unnecessary activity can cause accidents, distract others, and promote contamination.
5. **Do not EAT, DRINK, smoke or apply makeup in the lab !!!**
6. Keep doors and windows closed during the lab session to prevent contamination from air currents.
7. **Never place contaminated pipettes, loops, or articles on the bench top.**
8. Never discard contaminated cultures, glassware, pipettes, tubes, or slides in the trash container.
9. **Never discard contaminated liquids or liquid cultures in the sink !!!**

**Discard all unnecessary slides, used glassware and pipets into the *biohazard (red) containers !!!***

10. Mouth pipetting is strictly prohibited
  - mechanical pipetting devices are required.
11. Always use racks to hold tubes so that they can't fall over and contaminates the outside containers, the lab bench, or floor.
12. All procedures are conducted carefully to minimize the creation of splashes or aerosols e.g., don't shake cultures or material containing microorganisms unless the cap is very tight.
13. Use a safety cabinet when working with hazardous pathogens.
14. **If using a Bunsen burner:**

- **tie back long hair**
- **do not lean over the countertop**
- **always be aware of the flame**
- **keep flammable items away from the flame**
- **turn off the burner when not in use**
- **let burner cool down before touching them**



## Personal Protective Equipments

1. Lab coat:
  - a fresh, clean, knee-length
  - should be removed before leaving the lab to non-lab areas

Lab coats must be kept in the indicated locker at the Department of Microbiology for the entire course (cannot be used in other Departments/Clinics) and can be collected (after sterilization) at the end of it.

2. Closed footwears should be cover entire foot to protect the skin from broken contaminated glass or splashes of blood or infectious body
  - overshoes worn over the ordinary shoes are not recommended.
3. Gloves: latex, vinyl or heavy-duty gloves.
4. Mask and goggles: should be worn during procedures that are likely to generate splashes or sprays of blood, body fluid, secretions or excretion.

**All human blood and certain other body fluids are treated as if they are infectious for blood-borne pathogens, such as:** human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), etc.

**Therefore:**

- Wear gloves.
- Change gloves when they are soiled or torn.
- Remove gloves when you are finished handling a specimen, and before you touch other objects such as drawer handles, door knobs, refrigerator handles, pens/pencils, and paper.
- Wash hands thoroughly with soap and water after removing gloves.
- Dispose of gloves and bloodcontaminated materials in a biohazard container.
- Wear a mask, goggles, or glasses with side shields if splashing of the face is possible.

### Hand Hygiene

**Hand washing is the most effective method for preventing transfer of microorganisms and infections.**

**The microbial flora (microbiota) of the skin consists of resident and transient microorganisms**

**Resident microbial flora:**

- the resident flora is the normal flora of the skin (e.g. coagulase negative staphylococci and diphtheroids)
  - its pathogenicity is low
- **transient microbial flora:**
  - represent recent contamination of the skin
  - **pathogenic, and may cause disease** e.g. *Escherichia coli* and *Staphylococcus aureus*



*Areas missed during handwashing.*

## Types of hand washing in the laboratory:

### 1. **Social (Routine) hand washing**

The purpose is to remove soil and transient flora.

#### Procedure:

1. **Watches and rings should be removed.**
2. The hands are washed with plain soap and running water.
3. **Enough soap is used to produce a visible lather, which is rubbed over all surfaces of hands (palm, back, the thumb, and between fingers) for >10-15 seconds**
4. **The hand is rinsed under a stream of water and dried in with disposable paper towel.**
5. **If the sink does not have foot controls or an automatic shut off, a paper towel may be used to shut off the faucet to avoid re-contamination of the hands.**

### 2. **Hygienic hand washing**

The purpose to remove and kill transient and some resident flora.

Procedure (please see the pictures below):

- **Watches and rings should be removed.**

#### **Handwashing:**

The hands are washed with:

- **antimicrobial soap (antiseptic detergent) + water for 40-60 sec.**  
(e.g. Povidone – iodine/detergent solution)

#### **Handrubbing:**

- **alcohol based preparation** (effective than aqueous preparation)  
e.g. 70% ethanol or isopropanol:  
- **0.5% chlorhexidine in 70% ethanol**
- **3-5 ml of the alcoholic preparation should be applied to hand and rub to dryness for 20-30 sec.**

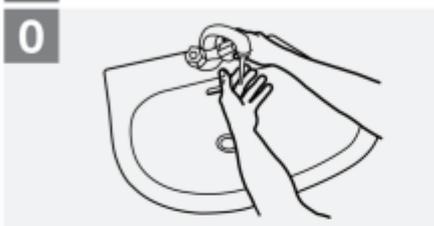
#### **Wash your hands:**

- **after handling infectious materials**
- **after contact with blood, body fluids, secretions, or excretions**
- **after removing gloves, and before leaving the lab**
- **before and after performing any personal body function** e.g..eating, blowing and wiping nose, using the toilet or combing hair

# WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

 Duration of the handwash (steps 2-7): 15-20 seconds

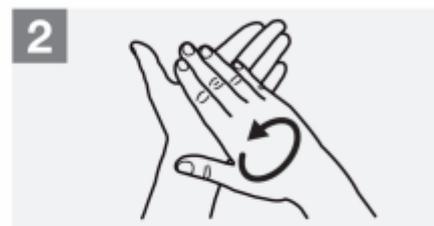
 Duration of the entire procedure: 40-60 seconds



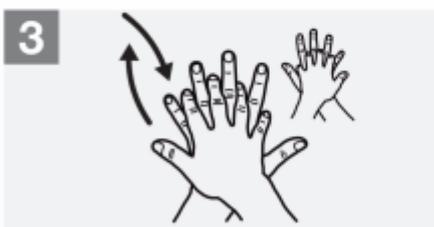
Wet hands with water;



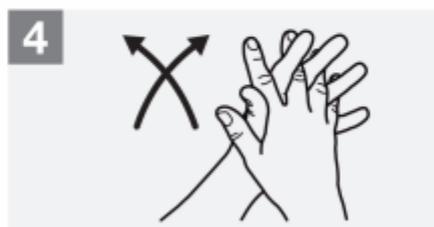
Apply enough soap to cover all hand surfaces;



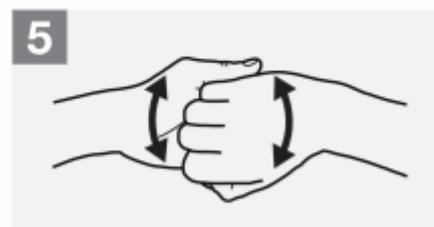
Rub hands palm to palm;



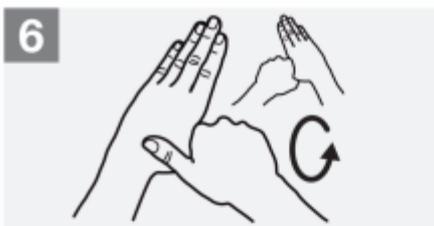
Right palm over left dorsum with interlaced fingers and vice versa;



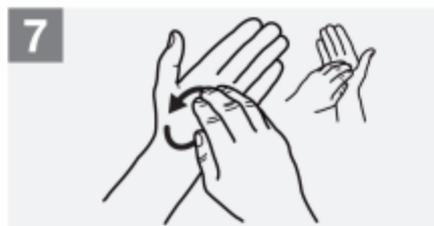
Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



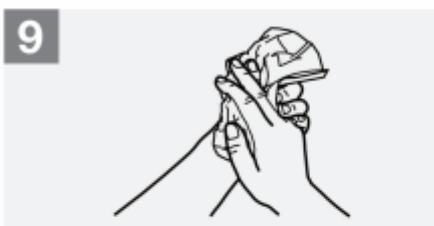
Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



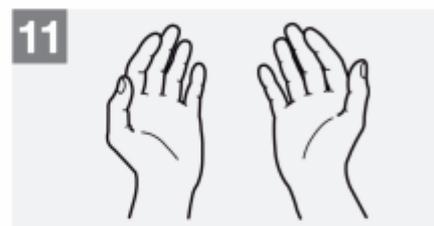
Rinse hands with water;



Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.



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SAVE LIVES

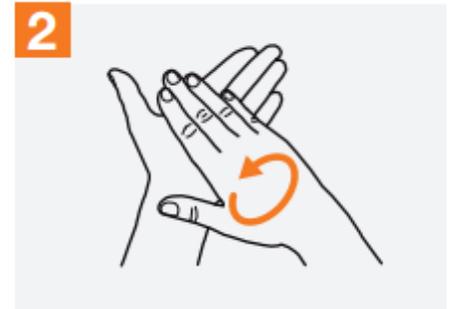
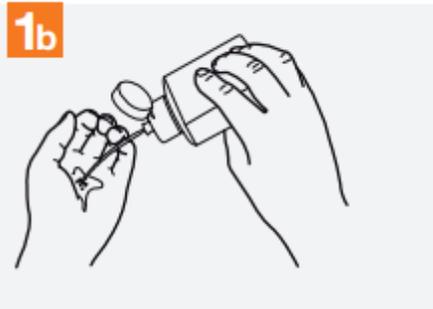
Clean Your Hands

# RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

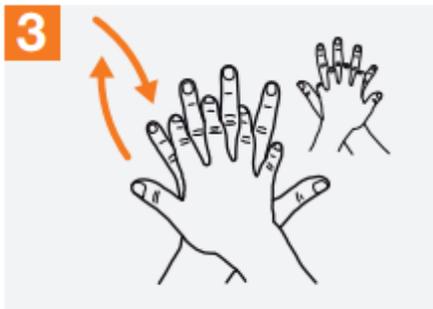
 Duration of the entire procedure: **20-30 seconds**



**1a** Apply a palmful of the product in a cupped hand, covering all surfaces;



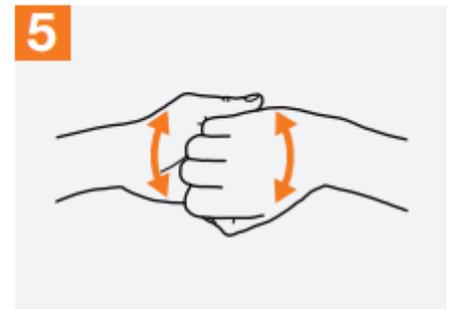
**2** Rub hands palm to palm;



**3** Right palm over left dorsum with interlaced fingers and vice versa;



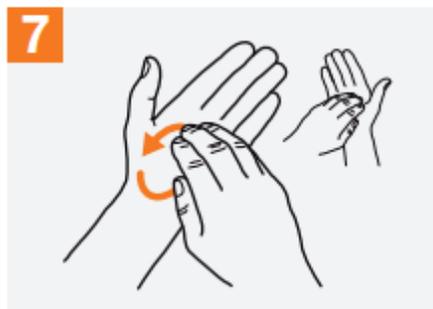
**4** Palm to palm with fingers interlaced;



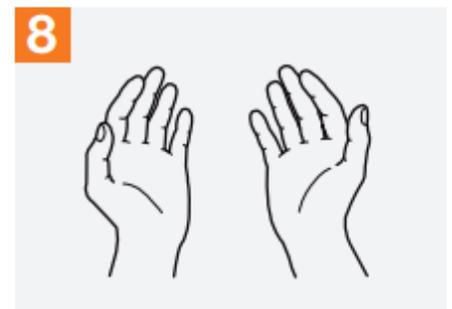
**5** Backs of fingers to opposing palms with fingers interlocked;



**6** Rotational rubbing of left thumb clasped in right palm and vice versa;



**7** Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



**8** Once dry, your hands are safe.



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SAVE LIVES

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