SAWA UNIVERSITY

MTJ2

اسم المادة و الكورس

LAB2. LABORATORY SAFETY

Sawa University	جامعـــــة ســـــــاوة الاهلية
College of health and medical techniques	كليـــــة التقنيـــات الصحيـة والطبيـة
Department of Medical Laboratories	قسم تقنيات المختبرات الطبية
Third Stage	المرحلـــــــــــة الثالثة

تدريسي المادة : م.د.عباس علي منشد
م.م. مهند ذجر اليونسي
م.م. ايات سلطان

الجانب العملي:الوراثة الطبية

Medical genetics-Practical

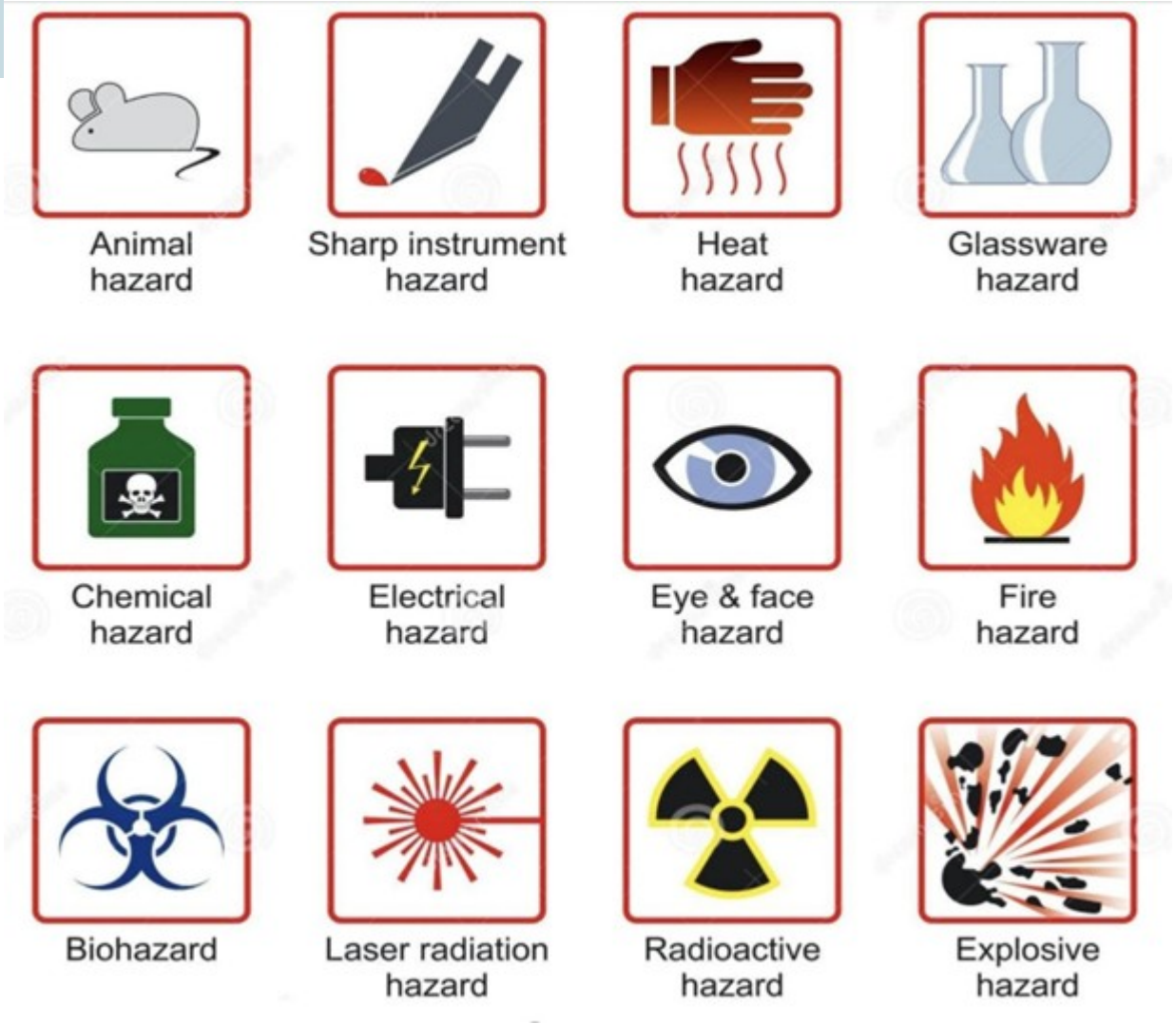
محاضرة رقم 2

Lecture No. 2

Learning Objectives

By the end of this practical session, students should be able to:

- **Explain the importance of laboratory safety in medical genetics.**
- **Describe the different types of laboratory hazards.**
- **Understand Biosafety Levels (BSL-1 to BSL-4) and their applications.**
- **Identify the types of Biosafety Cabinets (BSCs) and their functions.**
- **Apply laboratory rules, PPE, and waste management procedures.**



Introduction to Laboratory Safety

- Laboratory safety ensures protection of staff, samples, and the environment.
- In genetics labs, risks include infectious agents, mutagenic chemicals, UV light, and fragile equipment.
- Following biosafety principles guarantees accurate results and a safe working environment.
- Safety is not optional; it is an essential component of professionalism in science.

Biosafety Levels (Overview)

- **BSL-1:**

Basic teaching labs, no pathogens.

- **BSL-2:**

Moderate hazards (human blood, clinical samples).

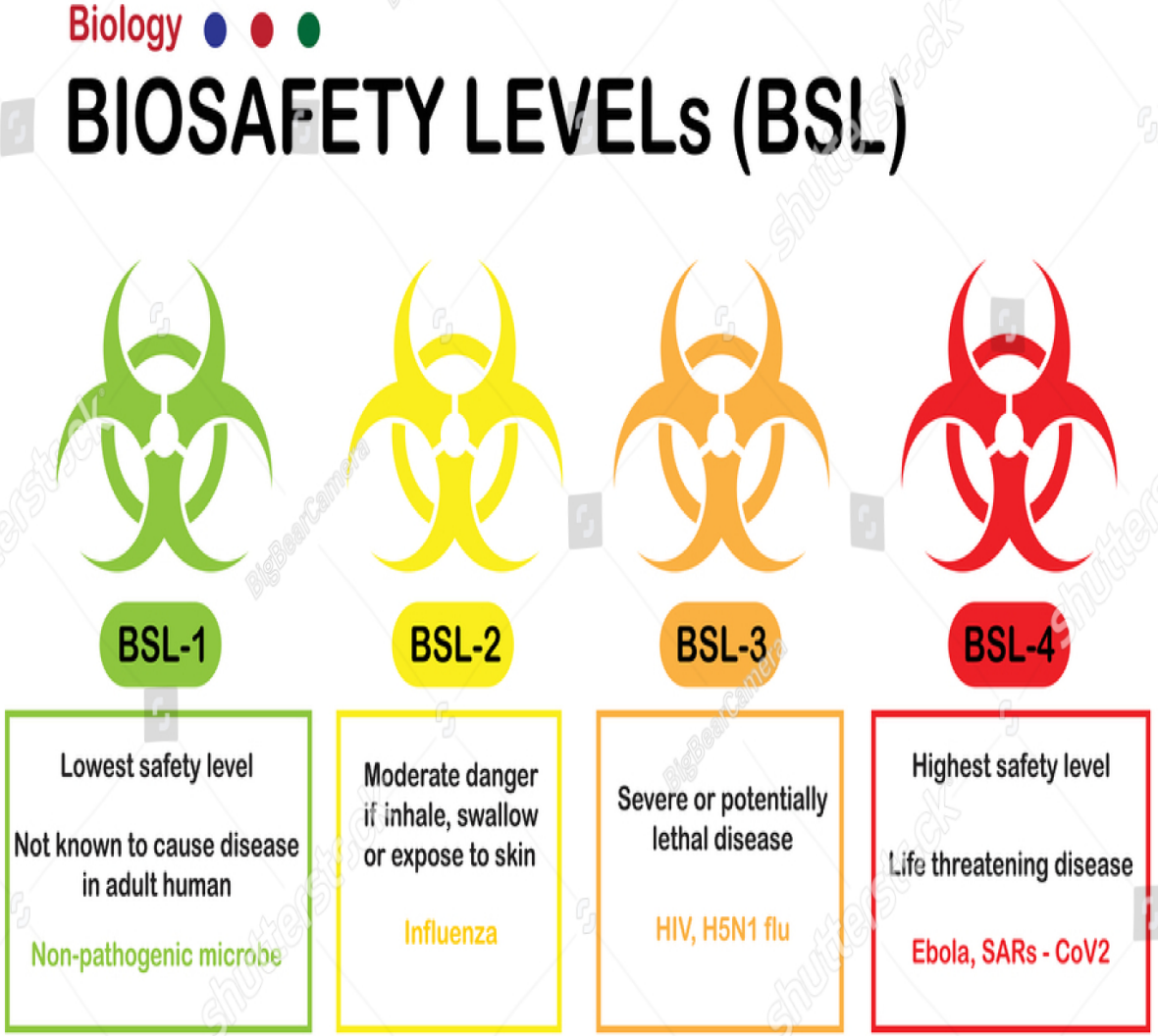
- **BSL-3:**

Serious pathogens transmitted by inhalation (TB, SARS).

- **BSL-4:**

Life-threatening pathogens (Ebola, Marburg).

- **Medical genetics laboratories usually require BSL-2.**



BSL-1 (Basic Level)

- Non-pathogenic organisms (e.g., E. coli K12).
- Work done on open benches.
- PPE: lab coat, gloves, and hand washing.
- Suitable for teaching undergraduate labs

BSL-2 (Moderate Risk)

- Human blood, tissues, and clinical samples.
- Associated with moderate-risk pathogens (e.g., Staphylococcus aureus).
- Access is restricted to trained personnel.
- Requires biosafety cabinets (Class II) for handling infectious material.
- Decontamination of waste (autoclave) is mandatory.

BSL-3 (High Risk)

- Pathogens transmitted by inhalation (e.g., Mycobacterium tuberculosis).
- Work must be done in Class II or Class III biosafety cabinets.
- Access strictly controlled; negative airflow in the lab.
- Double-door entry and sealed windows.

BSL-4 (Maximum Risk)

- Dangerous, exotic, life-threatening agents (e.g., Ebola, Marburg).
- Work performed in Class III biosafety cabinets or full-body positive pressure suits.
- Separate building with independent ventilation.
- Extreme security and control measures.

Biosafety Cabinets

- Biosafety Cabinets (BSCs) are enclosed, ventilated lab workspaces.
- Protect laboratory personnel, samples, and the environment.
- Equipped with HEPA filters to trap infectious particles.
- Essential for working at BSL-2 and above.
- Do NOT confuse with chemical fume hoods (different purpose).

Types of Biosafety Cabinets

- **Class I:**

Protects the user and environment, but NOT the sample. Air passes through the HEPA filter.

- **Class II:**

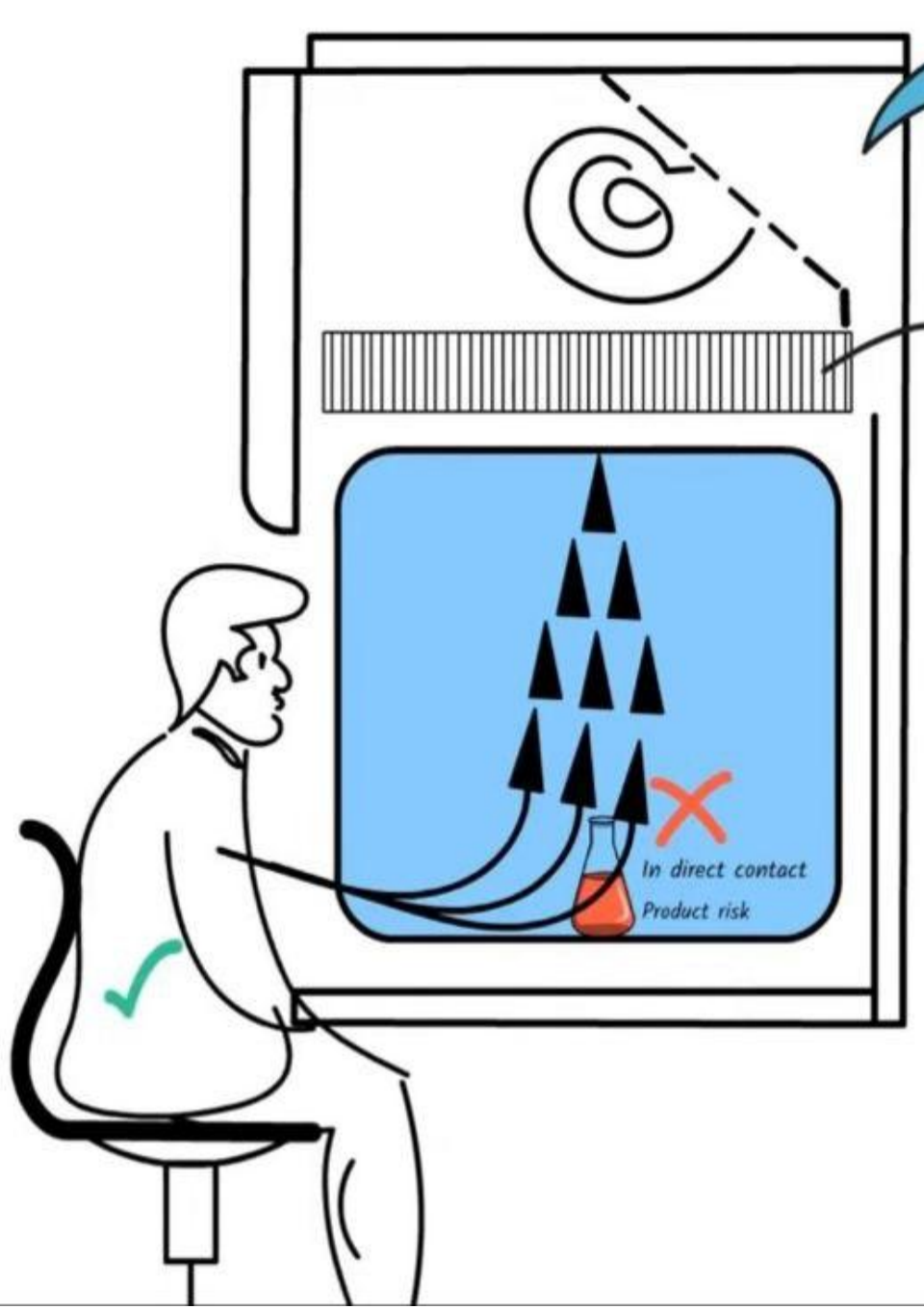
Protects user, environment, AND sample. Most common in medical genetics labs.

Air is filtered before reaching the sample and before leaving the cabinet.

- **Class III:**

Maximum protection, totally enclosed, work done via gloves attached to the cabinet. Used in BSL-4 labs.

Class-I

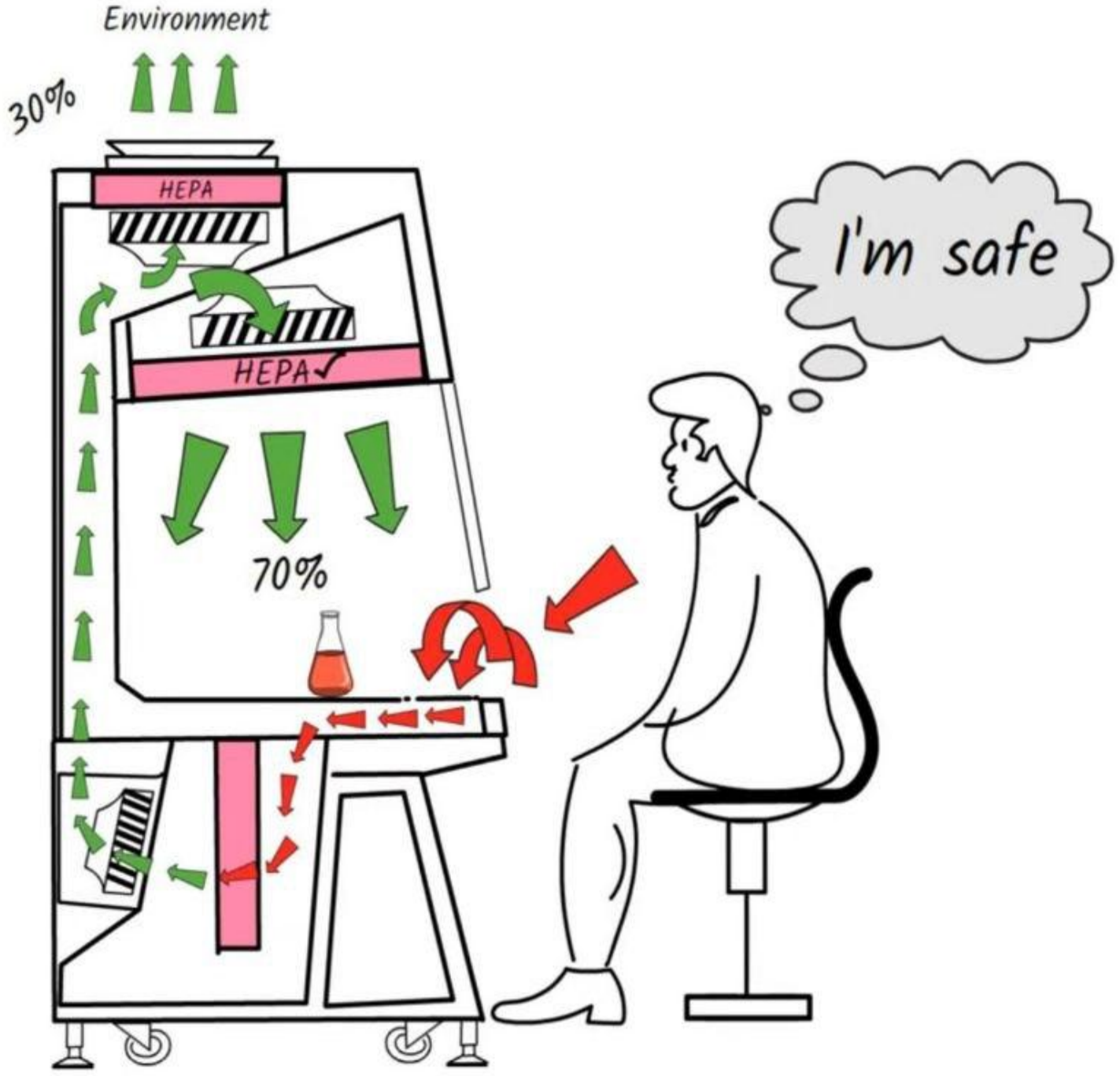


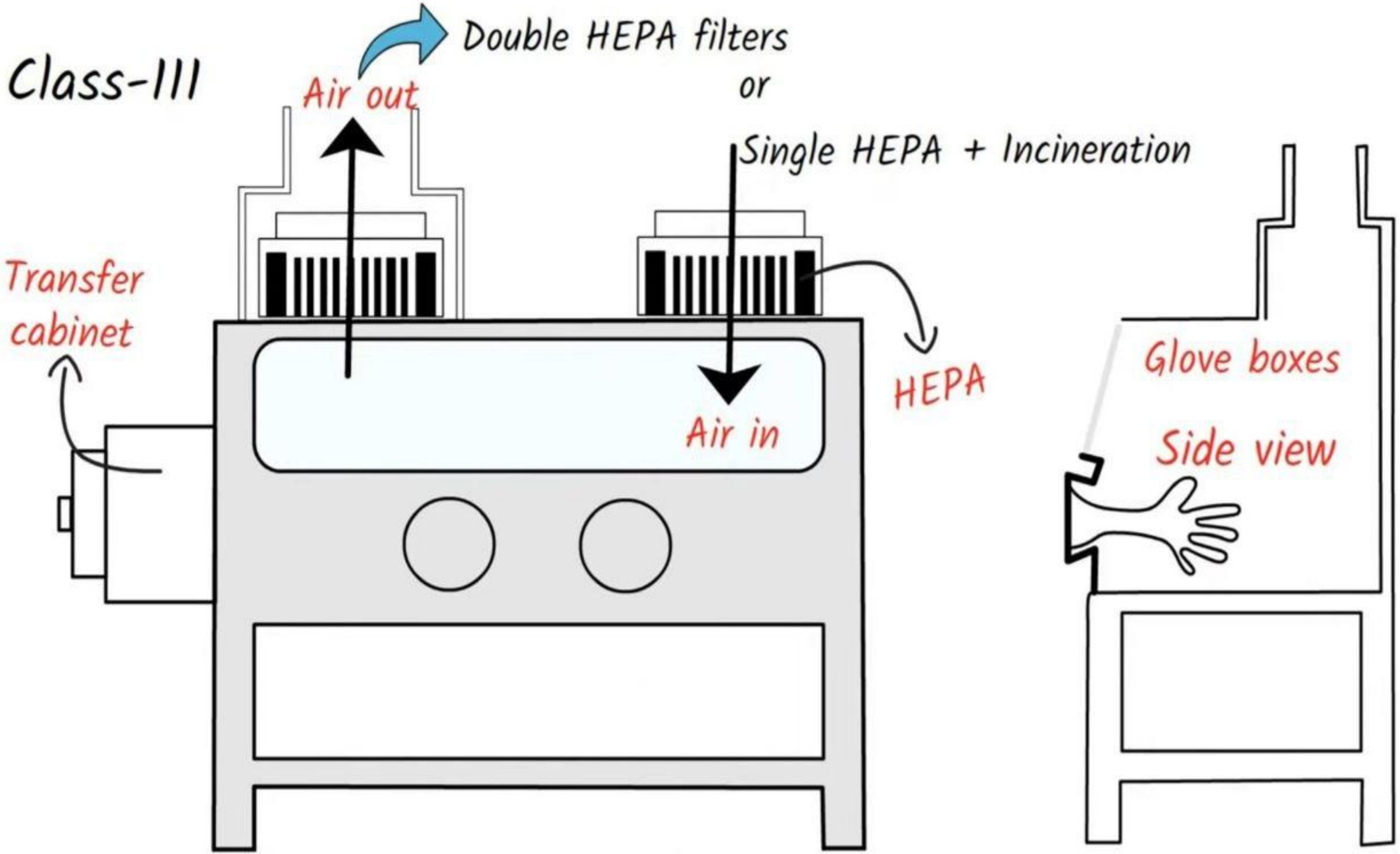
Operator ✓

Environment ✓

Product ✗

Class-II




Class-III
Air out
Double HEPA filters
or
Single HEPA + Incineration
Transfer cabinet
HEPA
Air in
Glove boxes
Side view

PPE and General Rules

- Lab coat, gloves, masks, and goggles are always required.
- Never pipette by mouth, never eat/drink in the lab.
- Wash hands regularly.

Waste Disposal & Emergency

- Biohazard waste: autoclave or incineration.
- Sharps: in puncture-proof containers.
- Spills: disinfect immediately and report.
- Emergencies: fire extinguishers, eyewash stations, and first aid kits must be accessible.

QUIZ

1. **What is the main difference between Class I and Class II biosafety cabinets?**
2. **Why do medical genetics labs usually require BSL-2?**

Any questions?