

Al-Mustaqbal University

College of Engineering and Technologies

Biomedical Engineering Department



Practical Biology

Lecture: 1

Laboratory Biosafety and Biosecurity

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Laboratory Biosafety and Biosecurity

Biosafety: the containment principles, technologies and practices that are implemented to prevent the unintentional exposure to pathogens and toxins, or their accidental release.

Biosecurity: the containment principles, technologies and practices that are implemented to prevent the intentional exposure to pathogens and toxins, or their intentional release.

✚ Biosafety Barriers in Labs

1. Primary barriers: Physical barriers or personal protective equipments for lab worker Gloves, masks, Goggles, aprons, suits, special breathing apparatuses.

Personal Protective Equipment

Used to reduce your risk of exposure



Safety glasses



Gloves



Jacket/lab coat



2. Secondary barriers: structural aspects of the laboratory that make working environment safer against infection such as Sinks for hand washing, Special containment areas, Special air ventilation patterns and Sterilization equipments.

Biosafety Levels

A biosafety level is the level of the bio containment precautions, required to undertake while handling dangerous biological agents in an enclosed facility.

On the bases of nature of microbes, Labs are divided into **four biosafety levels**; in which protective practices increase with each level:

Biosafety Level	Description	Sample Organisms	Pathogen Type
Level 1	- No Containment - Defined organisms - Unlikely to cause disease	<i>E. coli</i>	Agents that present minimal potential hazard to personnel and the environment.
Level 2	- Containment - Moderate Risk - Disease of varying severity	Influenza, HIV, Lyme Disease	Agents associated with human disease and pose moderate hazards to personnel and the environment
Level 3	- High Containment - Aerosol Transmission -Serious/ Potentially lethal disease	Tuberculosis	Indigenous or exotic agents, agents that present a potential for aerosol transmission, and agents causing serious or potentially lethal disease
Level 4	- Maximum Containment -"Exotic," High-Risk Agents -Life-threatening disease	Ebola Virus	Dangerous and exotic agents that pose a high risk of aerosol-transmitted laboratory infections and life-threatening disease

Standard practices required in Bio labs

1. frequent hand washing
2. door that can be kept closed when working.
3. limits on access to the lab space when working.
4. no smoking, eating, drinking, storage of food in laboratory.
5. care to minimize splashes and actions that may create aerosols (tiny droplets)
6. decontamination of work surfaces after every use after any spills.

A biosafety cabinet (BSC).

Also called as **biological safety cabinet** or **microbiological safety cabinet** , It is an enclosed, ventilated laboratory workspace for safely working with materials contaminated with (or potentially contaminated with) pathogens requiring a defined biosafety level, and there are four classes of Biosafety cabinet. **The primary purpose** of a BSC is to serve as a means to protect the laboratory worker and the surrounding environment from pathogens.



References

- 1.Laboratory biosafety manual, Third edition (WHO, 2004)
- 2.Biorisk management Laboratory biosecurity guidance (WHO, 2006)