Safety and biosecurity

Lecture.4

كلية آشور الجامعة/قسم علوم الحياة

المرحلة الاولى/الفصل الدراسي الاول

2022-2023

تدريسي المادة: م.م. الحسن طالب

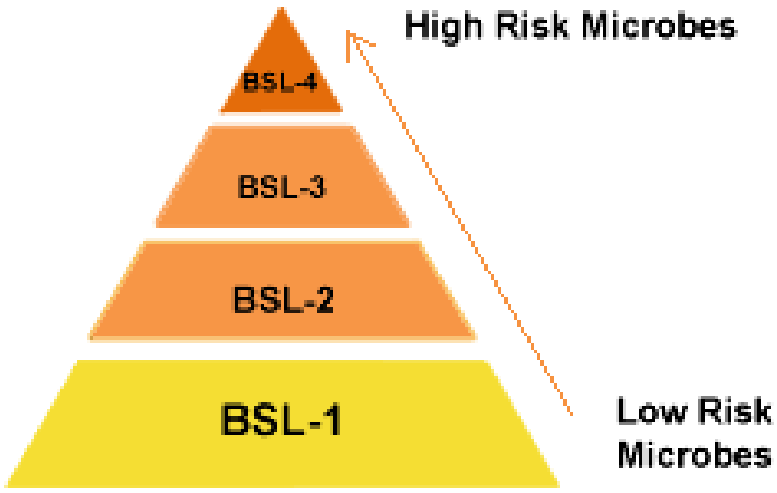
Biosafety containment levels

Biosafety levels (BSL) are used to identify the protective measures needed in a laboratory setting to protect workers, the environment, and the public.

The five biosafety levels are **BSL-1, BSL-2, BSL-3, and BSL-4**, with BSL-4 being the highest (maximum) level of containment.

Biosafety levels

- Level 1& 2: basic laboratories.
- Level 3: containment laboratories.
- Level 4: high containment laboratories.
- Level 5: NASA's policy for containing alien microbes.



Each level associated with appropriate equipment, practices, work procedures. Diagnostic and health-care laboratories must be biosafety level 2 or above.

Biosafety Level 1 (BSL-1)

BSL-1 labs are used to study infectious agents or toxins not known to consistently cause disease in healthy adults. They follow basic safety procedures, called **Standard Microbiological Practices** , and require no special equipment or design features.

Biosafety Level 2 (BSL-2)

BSL-2 laboratories are used to study moderate-risk infectious agents or toxins that pose a risk if accidentally inhaled, swallowed, or exposed to the skin. Design requirements for BSL-2 laboratories include hand washing sinks, eye washing stations in case of accidents, and doors that close automatically and lock.

Biosafety Level 3 (BSL-3)

BSL-3 laboratories are used to study infectious agents or toxins that may be transmitted through the air and cause potentially lethal infection through inhalation exposure. Researchers perform all experiments in **biosafety cabinets** that use carefully controlled air flow or sealed enclosures to prevent infection. safety features include the use of two self-closing, or interlocked, doors, sealed windows and wall surfaces, and filtered ventilation systems.

Biosafety Level 4 (BSL-4)

BSL-4 laboratories are used to study infectious agents or toxins that pose a high risk of aerosol-transmitted laboratory infections and life-threatening disease for which no vaccine or therapy is available. The laboratories incorporate all BSL 3 features and occupy safe, isolated zones within a larger building or may be housed in a separate, dedicated building. Access to BSL-4 laboratories is carefully controlled and requires significant training.

BSL	Laboratory type	Laboratory practices	Safety equipment
1	Basic teaching, research	Good microbiological techniques	None Open bench work
2	Primary health services; diagnostic services, research	Good microbiological techniques, protective clothing, biohazard sign	Open bench PLUS biological safety cabinet for potential aerosols
3	Special diagnostic services, research	As BSL 2 PLUS special clothing, controlled access, directional airflow	Biological safety cabinet and/or other primary devices for all activities
4	Dangerous pathogen units	As BSL 3 PLUS airlock entry, shower exit, special waste	Class III biological safety cabinet, positive pressure suits, double ended autoclave (through the wall), filtered air