

Subject: Biological Hazards // lec 2

Biological Hazards:

Routes of exposure: paths by which humans or other living organisms come into contact with a hazardous substance. **Three routes** of exposure are breathing (**inhalation**), **eating** or **drinking** (ingestion), and **contact with skin** (dermal absorption and scratches).

Valuable biological materials (VBM) or Bio hazardous materials

Represent infectious agents or hazardous biologic materials that represent a potential risk to the health of humans, animals, or the environment. The risk can be direct through infection or indirect through damage to the environment.

Biological hazardous materials include:

1. Biologic agents: Any microorganism (including bacteria, viruses, fungi, or protozoa), infectious substance, bioengineered, or synthesized component of any such microorganism or infectious substance capable of causing death, disease, or other biologic malfunction in a human, an animal, a plant, or another living organism; damage of food, water, equipment, supplies, or material of any kind; or deleterious alteration of the environment.

2. Biologic materials: Any biologically derived materials or materials that contain biological agents (including bacteria, viruses, genetically modified organisms or microorganisms, or prions), also include patient tissue samples, cellular lines of tissue culture, DNA materials, patients' tissues, organs, body fluids, biologic agents and toxins, venoms, allergens. Biologic materials are assumed as pathogenic or biohazards.

3. Biologic waste: any biohazardous or non-biohazardous waste containing biologic material, including but not limited to blood and blood products, clinical specimens, pathological waste,

animal carcasses and soiled bedding, cultures and stocks of microbial materials, sharps and other items that have been in contact with biohazardous materials, biotechnology by product effluents designated for disposal, and laboratory supplies, plastics, or glassware that have been in contact with biologic materials.

Classification of infective microorganisms

1. Risk Group 1 (no or low individual and community risk)

A microorganism that is unlikely to cause human or animal disease e.g. bread yeast *Saccharomyces cerevisiae*.

2. Risk Group 2 (moderate individual risk, low community risk)

A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment. Laboratory exposures may cause serious infection, but effective treatment and preventive measures are available and the risk of spread of infection is limited. E.g. *Staphylococcus aureus* and bacteria.

3. Risk Group 3 (high individual risk, low community risk)

A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available. E.g. *Yersinia pestis* (plague bacteria) and *Bacillus anthrax* (anthrax bacteria).

4. Risk Group 4 (high individual and community risk)

A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measures are not usually available. E.g. Ebola virus (haemorrhagic fever virus).