Al-Mustaqbal University

Dept. Medical Lab. Techniques

Diagnostic Microbiology /4th stage

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Lab 1

Diagnostic Microbiology : Purpose And Philosophy

The term diagnostic microbiology refers to the detection and identification of infectious agents in the clinical laboratory, followed, if necessary, by the determination of susceptibility to antimicrobial agents. In this field, infectious diseases and laboratory diagnosis, immunologic and molecular techniques that are practically applicable everywhere, and infectious agents and the diseases they cause are presented.

The Triad Of Infectious Diseases

1. The affected host.

2. An infectious agent.

3. The environment.

Infectious agents can be divided into a finite number of types. Most are free-living and contain all the machinery necessary for the maintenance and replication of their kind; they are generally referred to as microbes. Bacteria, fungi, parasites, and viruses are the traditional groups of infectious agents.

1. Bacteria contain the largest number of species that are pathogenic for humans. They are singlecelled and contain both DNA and RNA.

2. Fungi are single and multicellular organisms that contain a defined nucleus and cytoplasm; they are eukaryotic microorganisms (yeasts and molds).

3. Parasites are a large and very complex group of microbes. They include single-celled animals, such as the protozoa, and very complex, multi-celled organisms.

4. Viruses comprise a large number of infectious agents that do not have the complete biochemical organelles or processes to sustain their own propagation. viruses contain either DNA or RNA, but not both.

Interactions Between Hosts and Infectious Agents

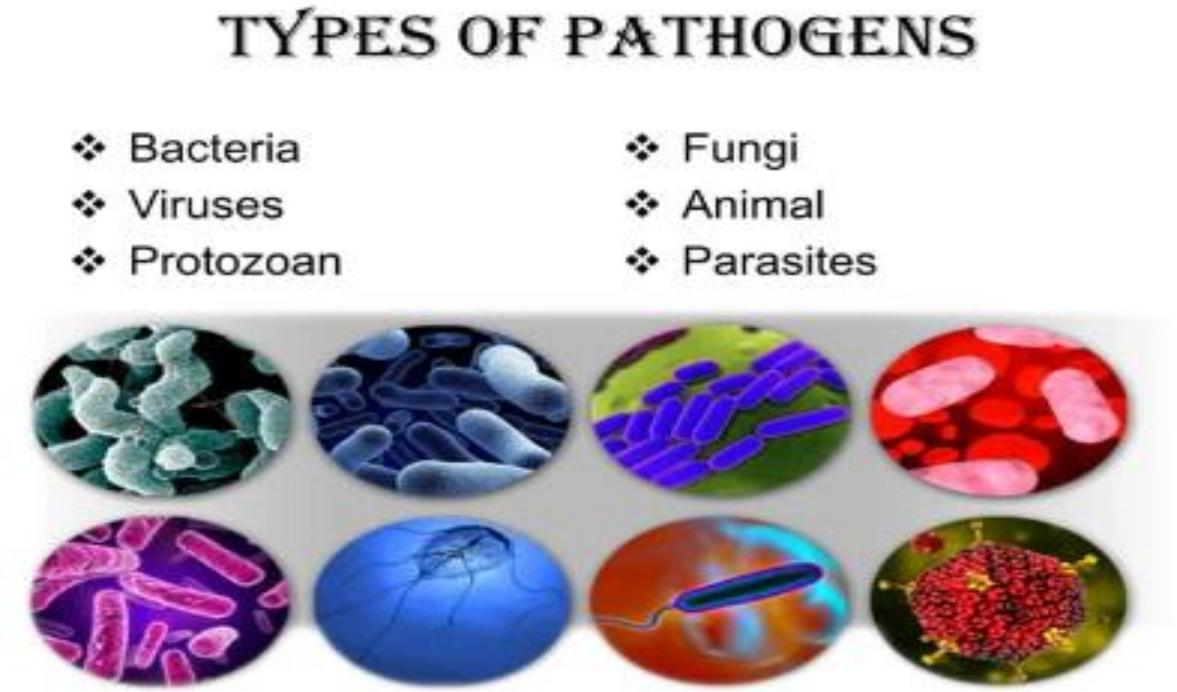
If two or more organisms exist together and each is neither rewarded nor damaged, the process is called commensalism. Such an agent is referred to as a commensal. If the infectious agent derives benefit from the host but causes no harm to the host, the microbe is designated a saprobe. If both organisms are saprophytic and benefit from one another, then the process is called symbiosis or mutualism. Conversely, if the host is damaged by the infectious agent with or without benefit to the infectious agent, the process is called parasitism, and the infectious agent is designated a parasite .

When microbes exist on body surfaces, either external (skin or hair) or internal (upper respiratory and gastrointestinal tracts), they are described as microbiota or colonizing flora. The relationship of the microbiota to the host may be commensal, saprobic, or parasitic. These relationships may change over time, if there is an alteration in the virulence of the microbe or a diminution in the ability of the host to resist infection. An organism that has demonstrated the ability to cause infections regularly is referred to as a pathogen.

Virulence is the sum of characteristics of a microorganism that increase the ability of that organism to cause disease, there are widely varying degrees of virulence.

The environment: the host range of some infectious agents is limited to humans. Maintenance of such organisms requires access to a new susceptible host and the ability to survive environmental factors during the transfer.

The Infected Host: the host is the organism that harbors the infection. It may be human, animal, or even another microbe, Once an individual has been infected, a variety of host responses are usually elicited. The response may be localized at the site of infection or may be generalized (systemic). The local reaction to infection takes the form of inflammation. Inflammation is a general term that refers to the response of the body to tissue damage.



Lab2 Laboratory Safety, Biological Agents And Biohazards

Laboratory Safety

Microbiologists doing diagnostic work will, of course, have to handle potentially pathogenic microorganisms and must observe regulations to avoid risks to themselves and others. Microbiology laboratory safety practices are also included

1. Wear gloves
2. Wash hands after working with infectious materials.
3. Disinfect all instruments immediately after use.
4. Disinfect all contaminated waste before discarding it
5. Report to appropriate personnel all accidents or exposure to infectious agents.
6. All specimens of blood and body fluids should be put in a container with a secure lid.
7. Mechanical pipetting devices should be used for manipulating all liquids in the laboratory and preventing using the mouth pipetting.
8. All persons should wash their hands after completing laboratory activities and should remove protective clothing before leaving the laboratory.
9. There should be no eating, drinking, or smoking in the work area.
10. Gloves should be changed after contact with each patient.

Sterilization and disinfection

Sterilization is a process that kills all forms of microbial life, including bacterial spores

Disinfection is a process that destroys pathogenic organisms, but not necessarily all microorganisms or spores.

Sterilization and disinfection may be accomplished by physical or chemical methods.

The physical methods of sterilization include:

1-burning

2- moist heat

3-dry heat

4-filtration

5-radiation

Biological hazards (biohazards)

It refers to organisms or organic matter produced by these organisms that is harmful to human health. These include parasites, viruses, bacteria, fungi, and proteins; their associated symbols are used as a warning, and people should take precautions

Biohazard Levels

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

Biohazard Level 1: (Minimum Risk)

Bacteria and viruses including Bacillus subtilis, canine hepatitis, Escherichia coli, varicella (chicken pox), as well as some cell cultures and non-infectious bacteria.

At this level precautions against the biohazards materials in question are minimal, most likely involving gloves and some sort of facial protection.

Biohazard Level 2:

Bacteria and viruses that cause only mild disease to humans, or are difficult to contract via aerosol in a lab setting, such as hepatitis A, B, and C, some influenza A strains, salmonella, mumps, measles, scrapie, dengue fever.

Biohazard Level 3:

Bacteria and viruses that can cause severe to fatal disease in humans, but for which vaccines or other treatments exist, such as anthrax, West Nile virus, SARS virus, coronavirus, tuberculosis, typhus.

Biohazard Level 4: (Extreme Risk)

Viruses and bacteria that cause severe to fatal disease in humans, and for which vaccines or other treatments are not available, such as Bolivian and Argentine hemorrhagic fevers, Marburg virus, Ebola virus, Lassa fever virus, Crimean–Congo hemorrhagic fever, and other hemorrhagic diseases.

Control the Biohazard in laboratory

Microbiological laboratories pose special safety problems, so the following policy and procedures must be followed,

1. Risk signs
2. Warning signs
3. Separate areas
4. Protective clothing
5. Safety cabinet
6. Decontamination
7. Levels of containment.