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Final Term assignment

Question no 1

Illustrate what are the difference between Sterilization, Disinfection and Antisepsis?

Sterilization:

1)Autoclave:

- The principle of sterilization in an autoclave is that steam under pressure is used to produce a temperature of 121°C which if held for 1minutes all microorganisms including bacterial endospores will be destroyed.

2)Sterilization of equipment and materials:

- Wire loop:Heat to redness in Bunsen burner flame.
- Empty glassware and glass (not plastic!) pipettes an Petri dishes: Either, hot air oven, wrapped in either grease proof paper or aluminum
- And held at 160°C for 2 hours, allowing additional time for items to come to temperature (and cool down).

Disinfection

- Disinfection is the destruction, inhibition or removal of microbes that may cause disease or other problems e.g .spoilage.
- It is usually achieved by the use of chemicals.
- Common disinfectants include phenol , formaldehyde, chlorine, and iodine
- Sanitization is a form of disinfection, generally as it applies to inanimate objects.
- Inanimate non living such as table , work bench area hospital wall and floor etc.

Antiseptic:

- Antiseptics are similar to disinfectants, but are generally considered to be substances that kill or inhibit microorganisms in contact with the body without causing extensive damage to the flesh.

- Aseptic techniques , refers to the exclusion of microorganisms from an environment or procedure.
- Antiseptics, including hydrogen peroxide ,rubbing alcohol, and iodine , are mainly used to prevent bacterial growth.
- In general ,they're used to clean the skin before an injection (like during a blood test) and can be used to clean wounds.
- if you're cleaning a reasonable wound , hydrogen peroxide can be a harsh treatment, most experts agree that soap and water is a better option.
- Some antiseptics may delay the healing process and worsen a wound's condition.
- Broad-spectrum antiseptics generally cover more pathogens and
- Chlorhexidine....
- Povidone-Iodine. ...
- Chloroxylonol.
- Isopropyl Alcohol...
- Hexachlorophene...
- Benzalkonium Chloride...
- Hydrogen peroxide..

Question no 2

What do you know about the common pathogen prevailing in Pakistan? Write down Disadvantages of some pathogen?

Common pathogen prevailing in Pakistan

Water contact disease

•Water contact diseases acquired through swimming or wading in fresh water lakes, streams, and rivers:

Leptospirosis -bacterial disease that affects animals and humans; infection occurs through contact with water ,food,or soil contaminated by animal urine;

•symptoms include high fever, severe headache, vomiting , jaundice ,and diarrhea;untreated,the disease can result in kidney damage, liver failure , meningitis,or respiratory distress

- Fatality rates are low but left untreated recovery can take months.

- Schistosomiasis** -caused by parasitic trematode flatworm Schistosoma ;fresh water snails act as intermediate host and release larval form of parasite that penetrates the skin of people exposed to contaminated water; worms mature and reproduce in the blood vessels, liver, kidneys,and intestines releasing eggs.

- Which become trapped in tissues triggering an immune response; may manifest as either urinary or intestinal disease resulting in decreased work or learning capacity;

lizetact disease

- Aerosolized dust or soil contact disease acquired through inhalation of aerosols contaminated with rodent urine:

- Lassa fever**-viral disease carried by rats of the genus Mastomys; endemic in portions of West Africa;infection occurs through direct contact with or consumption of food contaminated by rodent urine or fecal matter containing virus particles; fatality rate can reach 50% in epidemic outbreaks.

Respiratory disease

- Respiratory disease acquired through close contact with an infectious person:

- Meningococcal meningitis- bacterial disease causing an inflammation of the lining of the brain and spinal cord;

- one of the most important bacterial pathogens is Neisseria

meningitidis because of its potential to cause epidemics;

Animal contact disease

- Animal contact disease acquired through direct contact with local animals:

- Rabies**-viral disease of mammals usually transmitted through the bite of an infected animal, most commonly dogs; virus affects the central nervous system causing brain alteration and death

- The Pathogen:**Rabies is caused by the rabies virus, which is the type species for the Lyssavirus genus in the Rhabdoviridea family

- Rabies virus is an enveloped , single- stranded negative sense RNA virus with a helical capsid.

Tuberculosis

- Tuberculosis is caused by bacteria in the Mycobacteriaceae family.

- This family is comprised of many slow growing ,acid-fast bacilli, most of which live in soil and water and help to degrade organic material.

- M.tuberculosis causes the vast majority of human tuberculosis worldwide.

- Mycobacteria are very slow growing in culture, which can impede diagnosis for people with active tuberculosis.

- Mycobacteria require 4 to 6 weeks to grow on solid media, and 9 to 16 days using rapid liquid cultures

disadvantages of some pathogen

- Wide dynamic range of quantification (logarithmic decatles)

- High analytical sensitivity (<5 copies; 1fg to 10 pg bacteria DNA per PCR reaction)

- Better precision (<2% standard deviation)

- Closed system to reduce risk of contamination

- No post PCR processing

- Lower turnaround time increased throughput

- Multiplexing capabilities

Question no 3

Write down a brief note on fungal classification and pathogenesis?

Classification of Fungi

[Classification of Fungi]

- Fungi are classified according to their structure and method of reproduction.

- The four main groups of fungi are:

- Common molds (Zygomycota)

- Sac fungi (Ascomycota)

- Club fungi (Basidiomycota)

- Imperfect fungi (Deuteromycota)

Mechanism of fungal pathogenesis,

- Although most fungal diseases are the result of accidental encounters with the agent , many fungi have developed mechanisms that facilitate their multiplication within the host.

- For example , the dermatophytes that colonize skin, hairs and nails elaborate enzymes that digest keratin.

Entry:

- Fungi rarely cause disease in healthy immunocompetent hosts. Disease results when fungi accidentally penetrate host barriers or when immunologic defects or other debilitating conditions exist that favor fungal entry and growth.

Adaptation and propagation

- Fungi often develop both virulence mechanisms (e.g, capsule and ability to grow at 37C) and morphologic forms (e.g , yeasts , hyphae, spherules, and sclerotic bodies) that facilitate their multiplication within the host.

Dissemination

- Dissemination of Fungi in the body indicates a breach or deficiency of host defenses(e.g, endocrinopathies and immune disorders).

Host Factors

- Healthy , immunologically -competent individuals have a high degree of innate resistance to fungi. Resistance to fungi is based primarily upon cutaneous and mucosal physical barriers. Severity of disease depends on factors such as inoculum, magnitude of tissue destruction , ability of fungus to multiply in the tissue, and the immune status of the host.

Fungal Factors

- Enzymes such as keratinase, the presence of capsule in Cryptococcus neoformans, the ability to grow at 37°C , dimorphism, and other as yet undefined factors contribute to fungal pathogenesis which involves a complex interplay of many fungal and host factors.

Question no 4

Explain any one Water borne and Vector borne diseases.

Food poisoning

- Food poisoning occurs when you swallow food or water that contains bacteria, parasites, viruses, or toxins made by these germs. Most cases of food poisoning are from common bacteria such as Staphylococcus or E.coli."

- Food poisoning is caused when your body receives contaminated food, bacteria's, viruses, and

parasites' toxins.

causes-

1) infectious agents include viruses , bacteria and parasites.

a) **viruses**: Rotavirus, Hepatitis A virus

b) **Bacteria**: Salmonella , V cholerae , E. coli, Botulism

Prevention:

1. **Be selective**: Have only cooked food with standard preparation .Ingredients must be good, not anything about to expire. Food must not be kept too long.

2. **Be clean**: Always wash your hands well before eating. This is to get rid of virus and bacteria on your hands.

3. **Avoid risks**. Whenever many people suffer from diarrhea or food poisoning, you should avoid risky foods such as papaya salad, rice vermicelli and Sushi.

4. **Boost immunity**: Take good care of your health by getting adequate sleep and exercising regularly.

Treatment

• The symptoms of food poisoning go away in 2 to 3 days , and you do not need treatment ,you feel normal again.

• The goal of treatment is to replace fluids and electrolytes lost through vomiting and diarrhea. if dehydration is severe and cannot be managed at home, you may need treatment in the hospital, where fluids and electrolytes may be given to you by inserting a needle into your vein.

• Try to stay with your normal diet as much as possible . Doctors believed that eating a normal diet will also help you feel better faster.

Question no 5

Define : Mycobacteria

Mycobacteria:-

Mycobacteria are immobile , slow -growing rod-shaped ,gram-positive bacteria with high genomic G+C content (61-71%). Due to their special staining characteristics under the microscope, which is mediated by mycolic acid in the cell wall, they are called acid-fast. This is

also the reason for the hardiness of Mycobacteria.

2.Heterotrophs

A heterotroph is an organism that eats other plants or animals for energy and nutrients. The term stems from the Greek words hetero for "other" and trophe for "nourishment." Organisms are characterized into two broad categories based upon how they obtain their energy and nutrients: autotrophs and heterotrophs.

3.Metabolism

- Metabolism is the sum of all of the chemical reactions that occur in the living organism.
- These chemical reactions are necessary to sustain life!
- Metabolism is a requirement for life.
- This energy is required for growth , repair , and maintenance of the chemical and physiological processes of the cell.
- Energy is also needed to maintain the structural integrity of the cell by repairing or replacing damaged components.

4.Photoheterotroph:

Photoheterotrophs are heterotrophic organisms that make use of light energy as their energy source.They also cannot use carbon dioxide as their sole carbon source. ... These organisms are purple non-sulfur bacteria ,green non-sulfur bacteria , and heliobacteria.

5.Cutaneous Leishmaniasis

Cutaneous leishmaniasis is the most common form of leishmaniasis affecting humans. It is a skin infection caused by a single-celled parasite that is transmitted by the bite of a phlebotomine sandfly . There are about twenty species of Leishmania that may cause cutaneous leishmaniasis.