

Medical Microbiology. Dental 4th semester.

Mid-term assignment paper.

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Instruction; Write briefly and up to the point. All questions carry equal marks.

1) Explain Structure of bacteria in detail ? also Explain some cell organelle of bacterial cell and its function

Ans: bacteria are prokaryotes because of lack of nuclei and membrane bounded organelles. Chromosomes consist of single DNA. Bacteria are found in cylinder, spiral, flagellated rods and spheres.

Evidence show us that bacteria exist as long as 3.5 billion years ago. It is the oldest organism on the earth but archaea are more oldest than bacteria. Scientists showed that bacteria and archaea developed from one common ancestor.

In 1600s, Antoni van Leeuwenhoek was the first person to study bacteria under microscope. Louis Pasteur and German physician Robert Koch showed that bacteria act like pathogens. In 19th Century later scientists told that bacteria may show beneficial effect in ecosystem. On the basis of oxygen supply bacteria are classified in two groups.

A] Aerobic Bacteria

Require oxygen for its survival and die without oxygen.

B] Anaerobic Bacteria

Can not tolerate oxygen and die when exposed to it. On the basis of obtaining energy bacteria are classified in two groups.

1/ Heterotrophic Bacteria

Bacteria that obtain energy from breakdown of organic compounds.

2/ Autotrophs Bacteria

They create own energy by using light and chemical reaction.

3] Capsule

Some bacteria bear capsule made of polysaccharides. The major role of capsule in bacteria to keep it from drying condition and protect it from phagocytosis.

4] Cell Envelope

It is composed of three layers, the anterior cytoplasmic membrane, cell wall and outer capsule.

5] Cell Wall

Each bacterium cell is enclosed by rigid cell wall made of peptidoglycan and polysaccharide molecules. It gives protection as well as keeps organelles from external environment. It has some appendages like pili and flagella which give help in movement of bacteria.

6] Cytoplasm

In cytoplasm of bacteria, growth, metabolism and replication are carried out to support bacteria cell. It is a gel-like structure composed of water, nutrients, enzymes, waste product, gasses, ribosomes and plasmid. The nuclei is not enclosed by nuclear membrane but genetic materials are localized. Plasmid is made of DNA and used in reproduction.

7] Cytoplasmic membrane

A layer of phospholipid and proteins called membrane, encloses anterior of bacterium and acts like a filter to allow to flow materials in or out of the cell.

8] Flagella

It is a hair-like structure originated from cell wall to help in locomotion of bacteria.

9] Nucleoid

It is a place in cytoplasm of bacteria where DNA is found. It is not a membrane-bounded nucleus. Most bacteria have single chromosomes for replication.

10] Pili

Hair-like structure which gives help for attachment of bacteria with other cells.

11] Ribosomes

They are found in all cells, including bacteria. They transfer genetic code from molecular

language of nucleic acid to amino acids.

Q:2. what is bacteria culture media, write down some types of bacteria culture media in detail?

Ans: For growth of bacteria, we provide growth media in which it gain nutrients from growth media. For determination of diseases, we separate bacteria and study it in media of growth under microscope. Growth media have two types.

1] Liquid Media

This media is gel and semiliquid in composition. This media show more help for micro organism to stay suspended.

2] Solide Media

In this media we added agar for solidification. This media composition is similar to liquid media, but agar is absent in liquid media. Agar act as a solidifying agent. From sea weeds we extract polysaccharide which is solide at 37 c. Polysaccharide inert against micro organism. That polysaccharide convert to agar and add it in media.

3] Basal Media

This media is prepared before the growth. In this media no more adding substance take place. It is a simple media which support most fastidious bacteria. It is used for primary isolation of micro organism. Example of this media is nutrient agar media.

4] Enriched Media

Adding more components from outside like blood, egg and serum. Enriched media selects for certain group of microbes. Example of this are blood agar media. Streptococcus bacteria grow on enriched media that causes hemolysis of blood.

5] Selective Media

This media of growth is favoring to a particular micro organism. This media discourage the non required micro organism. The best known example is Lewenstein Jensen. From patient of TB, we select a particular segment of sputum in which tuberculosis bacteria is present. And tuberculosis bacteria sprinkle over Lewenstein jansen as a result that medium encourage only tuberculosis bacteria.

6] Indicative Media

It is used for indication of a particular bacteria from group of bacteria. Chemicals added and micro organism react with them and give indication.

7] Transport Media

It is used for transport and research. We are adding materials for bacterial survival named pepton water. It is essentially solution of buffer with carbohydrates.

8] Storage Media

It is used to store bacteria for long time.

Q: 3. What is difference between sterilization and disinfection, write down some methods used for sterilization ?

Ans: Sterilization

It is a process by which all living cells, spores and acellular entities (viruses, viroids and prions) are either destroyed or removed from an object. Sterilant is the chemical used in sterilization. It is a procedure in which microbes are totally removed and denature through heat, chemicals, radiation, filtration and high pressure.

Disinfection

The bacteria is found in two forms namely vegetative and spore bearing bacteria. We added chemicals to denature the cell wall of bacteria but having no effect on spore bacteria that process occurs in disinfection. We used chemicals like alcohol, ethanol etc. This method is used for those instruments which are unable to adopt heat. It is a process of destroying pathogenic micro organism and remove most organisms present on surfaces.

METHODS OF STERILIZATION

A] Dry Heat Sterilization

This process requires a high temperature as compared to moist heat process. It is used for those materials that cannot be sterilized by steam. The oven must be equipped by adding forced air system to make distribution of heat throughout all material processed. User must monitor temperature at intervals of time.

B] Filtration

Sterilization by many used for solution. These may be sterilized by passing through sterile bacteria retaining filter. Appropriate care must be adopted to avoid loss of solute on filter. Suitable filter will prevent the passage of microbes. Micro organisms are removed through absorption on filter medium.

C] EXPOSURE TO IONIZING RADIATION

Gamma radiation and electron beams are used to effect molecules in organism. Mutation causes DNA damage that alter replication. Laws and regulation for protection against radiation must be respected.

D] GAS STERILIZATION

The active agent of the gas sterilization process may be ethylene oxide or others volatile agents. It is carried out under full protective process. The efficiency of any gas depends on its concentration and temperature.

Q:4. Write note on structure of fungi in detail?

Ans: STRUCTURE OF FUNGI

Fungi exist with two forms, hyphal and single cell budding form yeast. On the basis of classification of study, they are known as moulds, yeast, yeast like and dimorphic fungi. All fungi have eukaryotic morphology. They have cell wall made of chitin. Cellulose is found in some fungi cell wall. Inner to cell a plasma membrane is present and is made of sterols and ergosterol. Cytoplasm is composed of Golgi apparatus, mitochondria, endoplasmic reticulum, ribosomes, lysosomes, microtubules and enclosed membrane nucleus. Nuclear membrane persists in mitosis.

A] MOULDS

Mould thallus is composed of hyphae. It is elongated by growth at tips. Mycelium is a mass of hyphae. The hyphae are found in both branched and unbranched conditions. The cross wall of hyphae is known as septa. When the strand of hyphae is damaged as a result, the strand dies.

MYCELIUM ARE THREE TYPES

- 1: Vegetative mycelium absorb nutrients from surfaces.
- 2: Aerial mycelium grow on agar surfaces.
- 3: Fertile mycelium bear reproductive structures named sporangia.

PHAEOID: That possess melanin in cell wall.

HYALINE: That fungi do not possess melanin in cell wall.

On the basis of hyphae morphology there are six shapes of hyphae.

A: SPIRAL HYPHAE; these are coiled morphology found in Trichophyton.

B: PECTINATE; Unilateral projection like comb present in Microsporum audouinii.

C: FAVIC CHANDELIER; They resemble like antlers are found in trichophyton.

D: NODULAR ORGAN; That hyphae composed of twisted hyphae are present in Microsporum canis.

E: RACQUET HYPAE; One end of this hyphae is long and other remaining thin. They are present in Epidermophyton floccosum.

F: RHIZOIDES; Rod like morphology found in vegetative hyphae.

YEASTS

They are unicellular and reproduce by budding that form blastospore formation. Some time buds fail to detach forming a chain named pseudohyphae. Such yeast produce polysaccharide capsule. Capsule is stained by various types of ink. Majority of yeasts are pigmented in nature.

Q5: What are few hospital based infections that can be transferred to others due to unhygienic condition? Explain with an example.

Ans : All those infections that are not present in patient after admission in hospital, but they appear during stay in hospital is known as hospital based infection. Two forms of that infection.

A] AUTO INFECTION : The agents of causing infection is found at the time of admission in hospital but signs do not appear over body of patient. The infection develops in hospital more due to change of environment.

B] CROSS CONTAMINATION FOLLOWED BY CROSS INFECTION: During stay in hospital, the patient contact with new infection may create own infection. There is no difference between self infection and exogenous cross infection. Many microorganisms attack on mucous membrane where they form flora.

SOURCES OF INFECTION

Salmonella, Escherichia coli pathogens may present in food which causes infection. Staphylococcus aureus are passed through nasal passage and causing infection at the time when contact of patient is closed with others in hospital. Other pathogens which have show less symptoms are including streptococcus pyogenes, Corynebacterium diphtheriae. These microorganisms are released with more concentration in air and cause infection in hospital.

ROUTES OF TRANSMISSION

Microorganisms can transfer from one place to other places through air or vector. Vector born transmission in those countries where insects, arthropods and other parasites are more common. They transfer infection causes agents by use less time. Air borne transmission take place only in those area where microorganisms dispersed in the air. Few bacteria and viruses are present in expired air, and these are dispersed in large number only as a result of sneezing or coughing.