

**Medical Microbiology. Dental 4<sup>th</sup> semester.**

**Mid-term assignment paper.**

**INSTRUCTOR . Muhammad Sohail**

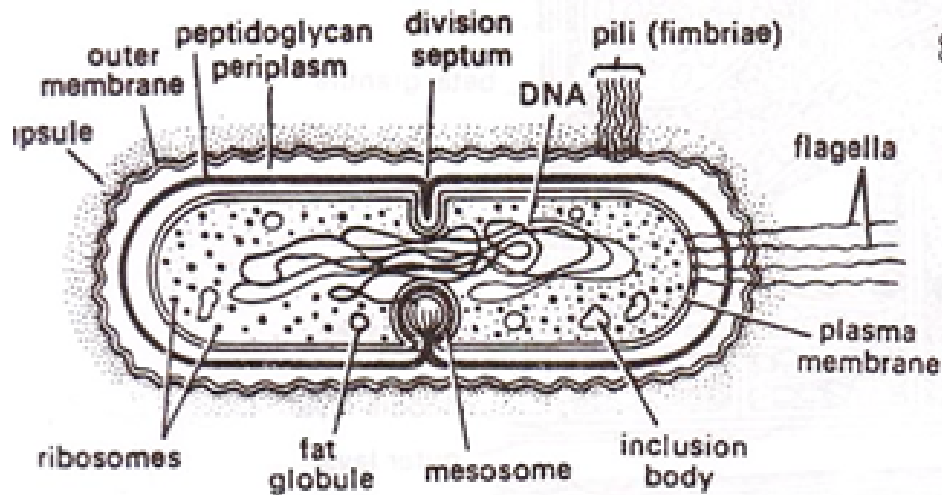
**Instruction; Write briefly and up to the point. All questions carry equal marks.**

- 1) Explain Structure of bacteria in detail ? also Explain some cell organelle of bacterial cell and its function
- 2) What is Bacterial culture media ? write down some types of bacterial culture media in detail.?
- 3) What is the difference between Sterilization and disinfection ? write down some methods used for sterilization ?
- 4) Write a note on Structure of fungi in detail ?
- 5) What are few Hospital based infections that can be transfer to others due to un hygienic condition ? Explain with an example ?

Name: Syed Muhammad Salman

ID No: 14790

Prog : BS Dental Technology 4th Semester



*Fig. 302. Structure of a typical bacterial cell.*

Ans:1 Bacteria is a prokaryotic cell which consists of only one cell, therefore called unicellular microorganism.

A bacterial cell remains surrounded by an outer layer or cell envelope, which consists of two components:

- a) A rigid cell wall
- b) A cytoplasmic membrane or plasma membrane.

The cell envelope in some bacteria may be enclosed in a loose slimy layer or capsule.

Some bacteria also carry flagella.

Fine hair-like fimbriae or pili are also present in some bacteria.

Bacterial cell wall is extremely thin (10-25 nm thick) and provides rigidity and a definite shape to the cell.

Cytoplasmic membrane is a thin (5-10 nm) layer lining the inner surface of the cell wall. It separates the cell wall from the cytoplasm.

Cytoplasm is present in the form of a colloidal system of several organic and inorganic solutes in a viscous watery solution.

Membrane-bound organelles, such as endoplasmic reticulum, mitochondria and Golgi- bodies are also absent in bacteria.

The bacterial cytoplasm contains several ribosomes which occupy the most part of the cytoplasm. These are the centres of protein synthesis. Ribosomes are the ribonucleoprotein particles of approximately 100 Å in diameter.

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Intracytoplasmic inclusions are volutin, polysaccharide, lipid, crystals and vacuoles.

Nuclear material is present in each bacterial cell, but there is no nuclear membrane or nucleolus. Bacteria are, therefore, prokaryotic.

Some bacteria possess some extranuclear genetic elements made up of DNA. These cytoplasmic carriers of genetic information are called 'plasmids' and 'episomes'.

Flagella are long, fine, hair-like, locomotory appendages, found commonly in rod-shaped and spiral bacteria.

Some very fine, hair-like, surface appendages, found in some Gram-negative bacilli are called fimbriae.

### Some Bacterial cell organelles and its functions:

Cell organelle	Function
Flagella	Swimming movement
Ribosomes	Sites of translation (protein synthesis)
Inclusions	Often reserves of nutrients; additional specialized functions
Chromosome	Genetic material of cell
Plasmid	Extrachromosomal genetic material

Ans:2 **Bacterial Cultural Media:**

Bacterial Cultural Media is the environment in which all the requirements of bacteria is available for the growth of bacteria.

Media: Either can be liquid or solid.

SOME BACTERIAL CULTURAL MEDIA:

1 **Basal Media:**

It is basic media.

Pre-made

No further addition

E.g : Nutrient agar media broth media(liquid media).

2: **Enriched Media:**

Means make further rich.

Add further components.

Additives are blood,egg,serum.

Blood agar media , streptococci grows on heamolysis.

3: **Selective Media:**

Favouring a particular microorganisms.

Discourage the non-required microorganisms.

Lj media(Lewenstein Janson)

4: **Indicative Media:**

We use it for identification of bacteria.

Specific chemicals are added.

Microorganisms reacts and give identification

E.g MC Konky agar Media.

5: **Transport Media:**

We use it when we transport bacteria from one place to another.

Adding nutrients for bacterial survival.

Pepton water ( sugar, alcohol).

6: **Storage Media:**

We use it when we store bacteria for some time.

Egg saline media..

Ans: 3

<b>Disinfection</b>	<b>Sterilization</b>
We use chemicals in this process	Not use chemicals work through heat
Use for all instruments	Use only for those which stay against heat
Kill the microorganisms without spores	Kill all the microorganisms
It is not more effective	It is more effective

**Some Method use for sterilization :**

1: Physical > Heat> either dry or Moist.

Dry heat: in oven/ fire then sterilized

Moist heat: on Boiling then disinfect

2: Chemical: > Gases > oxide ( H<sub>2</sub>O<sub>2</sub>)

> Liquid> alcohol

3:Mechanical: Through filtration it filter upto 0.1mm

4: Biological: Viron/prion ,we start predator.

Ans 4: **Structure of fungi :**

There are a wide variety that range from the smallest unicellular fungi such as yeast to larger multicellular capable of forming hyphal threads or false roots. For this reason, fungi are also classified according to their morphologies.

The following are classifications of fungi based on morphology:

### **Yeast**

Yeast are single celled fungi . Unlike bacteria, yeasts are also eukaryotic, which means that they have different types of organelles that are common in the cells of higher animals.

The *Saccharomyces cerevisiae* is a good example of yeast that ranges between 1 and 7 micrometers in size. When viewed under the microscope, these organisms may be pigmented on their surface.

The *S. cerevisiae* contains such organelles as a membrane bound nucleus, a vacuole, mitochondria and the Golgi apparatus as well as the E.R (endoplasmic reticulum).

The cell wall of these yeast is composed of glucan (a polysaccharide compound) and mannoproteins.

### **Yeast-like Fungi**

Yeast-like fungi are yeast that partly grow like normal yeast. However, they also attach to each other to form what is known as a pseudohyphae (not a true hyphae).

*Candida albicans* is one of the most common. When viewed under the microscope, these organisms have been shown to consist of several layers that make up the cell wall.

As with yeast, the wall of *C. albicans* contains layers of mannoproteins, lipids and a beta glucan, a chitin inner layer that strengthen the cell wall. Like yeast, *C. albicans* also appear spherical or ovoid in shape and measure between 4 to 8 micrometers.

Since they also reproduce through budding, like yeast, *C. albicans* may end up creating an elongated chain of cells as they continue dividing to form the pseudohyphae. However, some studies suggest that some of the yeast-like fungi tend to form true hyphae in the process.

## **Molds**

Mold (Mould) are a type of fungi that often grow well in favorable environments with warmth and moisture. They can be found growing on various surfaces such as food surfaces from which they obtain their nutrients.

Compared to yeast, molds are multicellular organisms. As such, they can be seen with the naked eye without using a microscope. However, when viewed under the microscope, it is possible to observe numerous filaments (Hyphae) that are collectively referred to as Mycelium.

While these organisms are microscopic, it is their numerous hyphae (that form the mycelium) that make it possible to see mold as it grows on food surface (bread, oranges etc).

## **Dimorphic Fungi**

Dimorphic fungi exist in the form of mold and yeast. Examples of these fungi include *Penicillium marneffe* and *Mucor circinelloides*.

Most of these organisms are capable of switching from between the two forms in a process commonly referred to as dimorphic switching. As such, they are viewed as having hyphal threads or as single celled organisms under the microscope (yeasts).

Ans 5: **Most Common Healthcare-Associated Infections:**

### Hepatitis A

The Hepatitis A virus is the least common of the three major Hepatitis viruses found in healthcare settings. The virus is spread through the fecal-oral route, and healthcare personnel are often infected when handling a patient in whom the infection is not yet recognized, is fecal incontinent or has diarrhea.

### Hepatitis B

Hepatitis B can cause acute infections or chronic liver infections. An acute infection typically exhibits liver inflammation, vomiting and jaundice. Some acute cases can turn into chronic Hepatitis B, causing lifelong infection, cirrhosis, liver cancer, liver failure and death. HBV is typically spread through body fluids of an infected person being transmitted into a non-infected person, which in healthcare settings is often through contaminated needles, syringes or other sharps.

### Hepatitis C

Unlike HAV and HBV, there is no vaccine against HCV. While mainly transmitted through intravenous drug use in the community, the healthcare setting sees HCV transmission through contaminated syringes, needles or sharps, infected blood transfusions and sometimes even organ transplants that have not undergone adequate HCV screening.



## Human Immunodeficiency Virus

The HIV virus damages T cells that are vital in helping the body fight off diseases, leaving those infected at risk of many types of infections. Although HIV transmission in hospitals is rare, it is possible to be spread to patients via improper infection control procedures, such as sterilization and disinfection. HIV is transferred through bodily fluids, so healthcare personnel should take caution as they would with other bloodborne pathogens.

## Klebsiella pneumoniae

In the healthcare setting, Klebsiella bacteria, most often the pneumoniae species, cause urinary tract infections, wound infections, upper respiratory tract infections, osteomyelitis and even meningitis. The risk of infection heightens if a patient requires invasive medical devices, urinary catheters, ventilators and antibiotics. The Klebsiella genus has started developing antimicrobial resistance, causing treatment for such strains to be more limited. *K. pneumoniae* cannot be transmitted through the air, rather mainly through contact with an infected person. These bacteria are another that are normally found in the body but have the potential to cause infection. They cause approximately eight percent of HAIs in the U.S. and occur more frequently in premature infants and in the neonatal intensive care unit.